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THE New York *World*, which usually shows exceptional judgment and knowledge in its treatment of building matters, publishes an editorial in relation to the conduct of the Bureau of Buildings during the past year, which we think to be unintentionally unjust. Speaking of the inadequacy of the force of inspectors for the work required of them, it says: "Granted that the force is too small for the work it has to do, and that it is employed all the time in routine duties, it seems clear that the selection of the most important among the duties, some of which must be left undone, is not wisely made. It was surely as desirable the day before the burning of the Vienna theatre as the day afterwards to make sure that the appliances for putting out fires, and for securing the rapid dismissal of the audience, were sufficient in the theatres of New York," and so on. Farther on it says, "It ought not to be necessary to burn a theatre, or a hotel, or an apartment-house in order to direct official attention to the dangers of other buildings of the same class. If the chief of the Department has no power under the law to condemn structures which he may nevertheless consider unsafe, he can at least protest against the occupancy of such structures, and the most reckless tenants would scarcely run the risk of engaging and occupying apartments in a building against which the Superintendent of Buildings had formally protested as unfit for human habitation." While there is a great deal of truth in all this, it should be remembered that the Inspector of Buildings, far from being an absolute tyrant, as he is often called, is opposed whenever he exercises his discretion in matters within his province, with all the energy which selfish interest and conservatism can command; and any one who has followed the course of building cases during the past few years will remember that the opposition is in many instances successful, although the Inspector's orders may have been, as they usually are, quite justified, from the point of view of one who desires to save his fellow-citizens from danger, by the occasion which called for them. Under these circumstances it is natural, and fortunate for the people of the city, that he should seize the opportunity which a great catastrophe gives him, not for inquiring for the first time into a subject of which he was before ignorant, but for promulgating orders which he may have long contemplated, but did not venture to issue until he could be sure that the vast power of public opinion would aid him in enforcing them.

HOW essential this support is, and how unfounded is the *World's* idea that the simple protest of the Inspector will have any effect in warning the public against the buildings which he is powerless to have made secure, may be illustrated by one of the most recent cases in which his warning was given at the same time that his authority was exercised, — that of the Casino Theatre. All our readers will remember that some weeks ago the owners of this theatre, which, although occupied for representations, is unfinished, and contains an amount of temporary wood-work which may well be regarded as hazardous, were directed to place fire-escapes forthwith on the two fronts of the building, and the risk appearing imminent to the Inspector, as it did to at least one other person who visited the structure at the time, orders were given to suspend performances until the fire-escapes were ready for use. Unfortunately, although the matter excited some remark in the newspapers, no recent tragedy had terrified the public into seconding the Inspector's efforts, and his order was simply ignored. The fire-escapes which he called for were not built, or at least were not to be seen when we last noticed the building a week previous to the present writing; nor were the performances interrupted for a moment. On the contrary, they have continued to this day, before undiminished audiences, just as if the orders of the Bureau were meaningless gibberish, and as if open wooden stairs and doors of muslin stretched on frames left nothing to be desired in point of safety.

THE evidence taken at the inquest into the causes which led to the death of Mrs. Wakeman and her young daughter in the Cambridge Flats, in New York, two weeks ago, shows that the fatal fire was caused by the act of some person unknown, who, at the construction of the building, about four years ago, built the wooden header of one of the fireplaces into the party-wall in such a way that it was exposed to the heat from two warm-air pipes already in the wall and belonging to the adjoining house. The timber does not seem to have been necessarily in actual contact with the tin warm-air pipes, but the flue in which they were carried, in the manner usual in New York houses, happened to come in the framer's way, and he simply inserted the beam and left it there. The end of the header, according to the report of the Fire Marshal, was found badly charred, and seemed to have been smouldering a long time before the fire finally broke out into the air, burning off the baseboard in one of the rooms, at the same time that it made its appearance in the store-room underneath. From this place, full of combustible matter, the smoke and flame passed up the basement stairs, through a door which ought to have been shut, but of course was not, into the halls and staircases above. The whole building seems to have been of light construction, the party-walls, according to the testimony of the district inspector, being but twelve inches thick, to carry five stories. Of course, this would not be permitted under the present administration of the law, but in the good old days of accommodating inspectors the case was different. All the experts who were called upon agreed that light walls surrounded by stud-partitions, such as the one through which the fire penetrated the house, should be prohibited in buildings occupied by a number of families; and the jury, in their verdict, which censures the builder of the house, and the superintendent who approved its construction, took occasion to urge on the Legislature the passage of new laws, not only embodying this provision, but forbidding the erection of dwelling-houses of any kind more than six stories in height. It is touching to learn that in the opinion of all the expert firemen the younger lady might have saved herself, even in the midst of the smoke, by hurrying down the stairs, but so far was she from showing any disposition to desert her mother, that when found she was lying at the foot of the stairs from the fourth story, while her mother had already reached the head of the next flight below.

THE city of Cleveland, Ohio, has recently adopted a building ordinance, less detailed and minute than those of New York and Boston, but sufficiently comprehensive. Some of the provisions, where they differ from those of older building laws, show signs of having been drawn up in haste, as, for instance, in the second section, which limits the use of iron in the walls of buildings to those exceptional cases where the iron is backed with masonry, and thereby excludes from the territory included within the building limits all those constructions of wrought-iron covered with galvanized or painted sheet-metal which serve so excellent a purpose in many cases. In regard to the required thickness of walls, it is not surprising, considering the great discrepancies in the standards laid down by different statutes, and even in those which have formed a part of the same statute at different times, to see in the Cleveland ordinance a series of dimensions peculiar to itself, but it is difficult to understand the reasoning by which its framers should

have been led to see the necessity for compelling the owners of "business buildings" to make their front and rear walls as thick as the bearing walls, and to construct their interior partition-walls of the same dimensions as the rest. According to the tables given, the owner of a twenty-five-foot lot in Cleveland, who wishes to improve his property by erecting upon it a six-story building containing a store on the ground-floor and lofts over, with the stairway divided from the rooms by a brick wall, as is now very common, will hereafter be obliged to encumber the first story with walls aggregating, with the plastering on them, six feet in thickness of solid masonry, leaving him only nineteen feet of space for rental.

WE can hardly suppose that either the bricks or the workmanship of the Cleveland masons are so bad as to make so great a mass of wall necessary for sustaining a weight which two twelve-inch and one eight-inch wall of ordinary quality would carry indefinitely; and if, as is argued in New York, it is advisable to double the necessary thickness of exterior walls to prevent the possibility of heating them through by a fire on one side, this reasoning would not apply to interior partition-walls, which are, moreover, under the most favorable conditions for stability, being steadied by the floor-beams in every story. In some respects the rear walls of business buildings are under conditions similar to those of partition-walls, and although they are not so thoroughly secured in a vertical position, it is usual to regard twelve inches as a sufficient thickness for them, even where the front wall, which is usually much more weakened by openings, is sixteen or twenty inches thick, and the Cleveland table, which insists upon twenty-four inches, seems unnecessarily exacting. A clerical error has apparently been made in the eighth section, which directs that the "butt-ends of all joists, floor-beams and rafters" shall be cut on a splay of not less than four inches to the foot. This expression must refer to the ends of the beams which bear on the walls, although its natural meaning would seem to assign it to the ends of the beams which "butt" upon a girder, and which must of course be cut square. In other respects the new ordinance contains much that is to be commended. Flues for smoke are required without exception to be enclosed throughout with eight-inch brickwork; and steam-pipes are to be "properly protected," although the character of the protection is unfortunately left indefinite.

THE Committee on Street Railways of the Massachusetts Legislature is said to have resolved to report in favor of granting a charter to the Massachusetts Elevated Railway Company, which proposes to build and operate elevated railroads on the Meigs system in various parts of the State. The first line, if the Legislature should accept the report of the committee, will probably be built in Cambridge, as an experiment, and if it proves successful other lines will undoubtedly be built in the suburbs of Boston wherever the necessary permission can be obtained. The cost of a road on this system is so small in comparison with the enormous expense of constructing the New York elevated lines that it would seem to be for the interest of some, at least, of the street-car lines to join with the Meigs company in substituting its track for their own. In this way the long and unprofitable surburban routes might be extended far enough to gain a certain amount of through business, which could hardly be dealt with by the aid of horses alone, while the cost of removal of snow from the tracks in winter, which forms a heavy item of expense on such lines, would be entirely avoided.

A DEEPLY interesting account is given in the *Builder* of the experiences of a co-operative association of furniture-makers in Paris, which was formed a year ago, and has just presented its first annual report to its stockholders. It will be remembered that among the deplorable contests between capital and labor which have occurred in France in the last few years the strike of the cabinet-makers was one of the most serious, and before it was ended the trade in fine furniture had, in a great degree, left Paris to enrich the Belgian and German manufacturers. There was, therefore, when the men had succeeded in making terms for their labor, little employment for them, and the distress caused by the strike continued to be felt after it was over, almost as severely as ever. The workmen's association tried in vain to find a remedy for this state of things, but the discussions were monopolized by professional agitators, and nothing came of them. A few of the more peaceable men, however, endowed with common-sense and independence, and disposed to action rather than talk, met apart from the rest, and resolved, instead of waiting helplessly for employment, to employ themselves, and a rough plan was drawn up for a co-operative manufacturing association. A capital of fourteen thousand dollars was borrowed, and a workshop opened in the Rue du Chemin-Vert, Number 106, on the fifteenth of January, 1882. One hundred and forty members were enrolled, each holding one share of the capital stock, for which he was obliged to pay one hundred dollars, one dollar being payable upon the allotment of the share, and one dollar each month thereafter.

FOR some months little or no business came to the association. The members, however, maintained their organization, and sought work in shops outside, ten of them only keeping possession of their own premises, where they busied themselves about such small commissions as they could obtain; and at last a piece of good fortune fell to them in the shape of a government contract for some school furniture. The furniture was very simple and cheap, but other employment came at the same time, and thirty more members were called in, and set at work for their own benefit. The original regulations of the association limited the number of hours constituting a day's work to ten, but this proved quite insufficient for the zeal of men who were working for themselves, and a change was made in the by-laws, extending the day to thirteen hours. All the management of the affairs of the association is, by the constitution, entrusted to an executive committee, which appoints a director and a foreman of the shop, whose authority over the men is as complete as in any ordinary workshop, obedience to their delegated authority being, if anything, more ready and unquestioning than it would be to an outsider. In fact, the report of the association mentions a complaint of the members, on one occasion, that their foreman was not severe enough, and in general, the chief fear of the men seems to have been that they might be tempted to do inferior work. Many of them are workmen of the very best class, and in order to show their skill they have already made a number of specimen pieces, which are kept in a show-room set apart for them. To make sure of not degenerating in taste or skill, a committee of experts, consisting of two workmen in the shop and three employed outside, judges the merit of productions concerning which any doubt is expressed. Notwithstanding the difficulties which surrounded the beginning of the undertaking, and the short time during which the capital of the association was productively employed, the net profits of the year, after paying all expenses, and the wages of the men employed in the shop, amounted to thirteen hundred and fifty dollars. This is, to be sure, not a very large profit on the capital, considering that the men worked over hours to earn it, but it must be remembered that at one dollar per month the shareholders had paid in only twelve dollars each at the end of the year, so that their returns, in proportion to the sum paid in, were much larger than might at first appear. The future of the association looks so bright that plans have already been made for disposing of the surplus income which is expected. No dividends are to be paid in cash until the shareholders have fully paid for their stock, the profits being, until then, merely credited to them. After this, one-half of the net profits only is to be divided each year, the remainder being equally shared between a retiring fund for members, and a reserve fund for contingencies. A regular percentage of the income is to be reserved for replacing tools and purchasing improved machinery.

THIS is not the first association of the kind in France, and several similar ones were formed in other trades after the great strikes of 1881 and 1882, whose history we have yet to hear, although there are indications that they have generally prospered. For some reason the independence and self-control which the foundation of such bodies implies seem to be virtues natural to the French working-men, who have, moreover, a well-established reputation for that magnanimity which is willing to risk something or sacrifice something to carry out an idea. In England, although many co-operative manufacturing associations of the same sort have been formed, they have, we believe, invariably failed, the genius of the English seeming little adapted to united effort for a common end.

STONE SCULPTURE · BY VIOLLET-LE DUC

WATER-CLOSETS. — VI.

BUNNETT'S CLOSET. — The first closet invented with a valve which opens in a direction outward from the bowl was designed by an English engineer named Joseph Bunnett, in 1846. This closet was designed to be placed below the water-line or point of discharge.

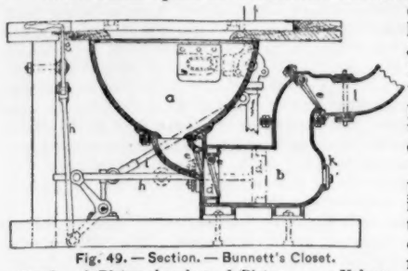


Fig. 49. — Section. — Bunnett's Closet.

a, Bowl. *b*, Piston chamber. *d*, Piston. *e*, Valves. *f*, Supply-pipe. *g*, Hand-lever. *h*, Piston-rod. *i*, Rod for operating supply-valve. *k*, Inspection-hole. *l*, Soil-pipe. *m*, Fan. *n*, Connecting-rod.

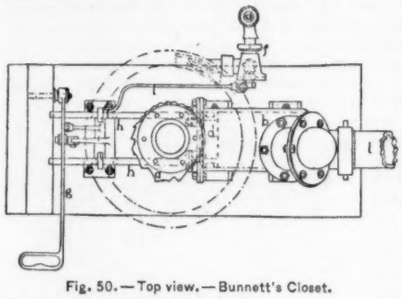


Fig. 50. — Top view. — Bunnett's Closet.

This closet appears to be simpler in its construction than the Downton closet, and for that reason would be better for the purpose which that is intended to fulfil. The outlet at the bottom of the bowl and the piston which works in the receiver both have flap-valves, which open from the bowl in an outward direction. The waste matter from the bowl will descend into the receiver by the action of gravity; thence it would be forced by the action of the piston through a third valve into the soil-pipe. The last-mentioned valve is for the purpose of preventing the return of the discharged matter into the receiver. The outlet of the soil-pipe may be carried in any direction desired. In this manner the discharge of the excreta may be governed to suit circumstances. Water-closets of this type may in rare instances become necessary; for instance, in cases where it is required to put a water-closet below the point of connection with the sewer.

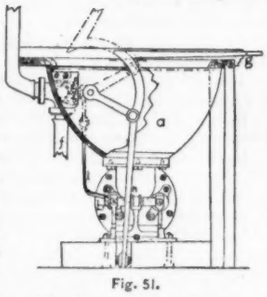


Fig. 51. Side view. — Bunnett's Closet.

When used it would be advisable to run the soil-pipe higher than its point of juncture with the sewer, so there could be no back-flow from the sewer in case the valves should leak, — and valves of this kind are liable to leak at the most inopportune time.

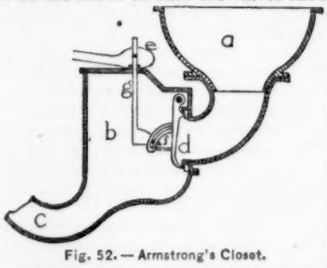


Fig. 52. — Armstrong's Closet.

a, Bowl. *b*, Receiver. *c*, Trap. *d*, Valve. *e*, Cam. *f*, Slotted quadrant. *g*, Connecting-rod.

Armstrong's Closet. — In 1848 a closet of this type and class was patented in England by John Armstrong. The novelty in this closet consists in the manner of opening the valve, by means of a slotted quadrant and cam. The valve is lifted by a cam attached to a vertical rod, the cam being bolted to the rod so that the valve will be lifted when the cam is turned on its greatest axis.

Feilding's Closet.—Another English patent was taken out for a closet, in which the valve opens outwardly, in the year 1855, by Fletcher Feilding.

There is a reservoir below the bowl that forms a water-seal trap for the overflow. This reservoir would become very filthy from deposits and stagnant water, as there is no means of flushing it. The valve has a leather washer and is lifted by means of a crank that works in a U-shaped attachment to the valve.

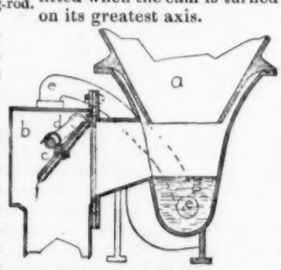


Fig. 53. — Feilding's Closet.

a, Bowl. *b*, Receiver. *c*, Valve. *d*, Crank. *e*, Overflow. *f*, Washer. *g*, Trap to overflow.

Bean's Closet. — Bean's closet, used in Scotland, may properly be classified as one of this type of valve-closets. The valve seems intended only for the purpose of retaining a large amount of water in the bowl, so that by opening the valve quickly the whole amount would be discharged suddenly into the soil-pipe, for the purpose of scouring it more thoroughly. There is an opening above the valve which is an overflow. This closet is simply a short hopper-closet with its trap, the valve being placed where the trap discharges into the soil-pipe.

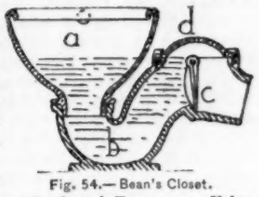


Fig. 54.— Bean's Closet.

a, Bowl. *b*, Trap. *c*, Valve. *d*, Inspection-cover.

Dummis's Closet. — M. F. Liger, in the French work on water-closets, urinals, etc., published in 1875, describes, among other closets, a valve-closet of this type, which he tells us was at that time (1875) in common use in France. This closet has a chamber or compartment at one side, very similar in appearance to the ones used in connection with plunger-closets. In this chamber there is a weight attached to the rod of the hand-pull and connected with the valve by a short hinged arm. The weight, which moves only in a vertical direction, keeps the valve pressed tightly against its seat, and unless the weight is lifted, it would be impossible for the valve to open. M. Liger says of this closet, that it is one of the best, uniting all the conditions required for health, and that it is odorless. I can see no reason why it is exempt from the faults of the class to which it belongs.

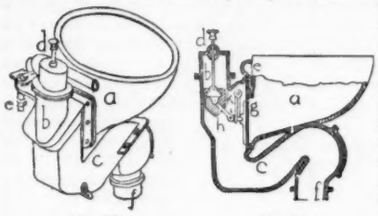


Fig. 55. Fig. 56.

Dummis's Closet.

a, Bowl. *b*, Valve-compartment. *c*, Trap. *d*, Hand-pull. *e*, Supply-pipe. *f*, Soil-pipe. *g*, Valve. *h*, Weight. *i*, Connecting-arm. *k*, Hinge.

Dummis invented, in connection with his closet, a device for separating the liquid from the solid excreta. At the point where the trap enters the soil-pipe it is divided into two branches. A grating or perforated plate is placed over the outlet nearest the closet, while a valve opening outward closes the one farthest from the closet bowl. This valve is held in position by two weighted levers. When the waste matter is discharged from the bowl, it passes through the trap, but is checked by the valve and stopped directly over the grating. The liquid matter would then pass through the perforated plate into the branch of the soil-pipe nearest the closet bowl, leaving the solid matter to be discharged into the other branch of the soil-pipe by opening the valve. This would be accomplished by raising the weighted levers on the outside. By thus dividing the liquid from the fæcal matter, its manurial qualities can be more easily utilized, and I find that the French inventors almost invariably have this point in view in making their inventions. This practice must often be a detriment to comfort by reason of the unpleasant odors generated, and to cleanliness and health, for as soon as the liquid matter is separated from solid matter, all the scouring and deodorizing qualities of water are lost. The soil-pipes must become very foul, as the solid excreta passes, in many instances, through several stories before reaching its final receptacle in a large barrel or iron can (*Fosse mobile*).

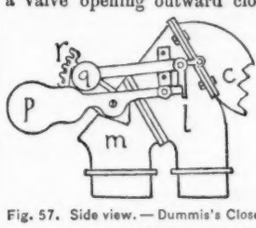


Fig. 57. Side view. — Dummis's Closet.

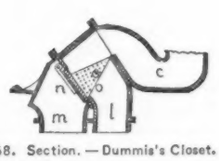


Fig. 58. Section. — Dummis's Closet.

Device for dividing liquid from solid excreta.

c, Water-closet trap. *l*, Soil-pipe for liquid matter. *m*, Soil-pipe for solid matter. *n*, Valve. *o*, Perforated plate. *p*, *q*, *r*, Combination of weights and levers for valve.

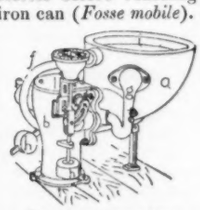


Fig. 59. — Perspective.

Fig. 60. — Section.

Doulton's Trapless Closet.

a, Bowl. *b*, Valve-compartment. *c*, Valve. *e*, Vent. *f*, Supply. *g*, Overflow. *h*, Weights. *i*, Flushing-rim. *k*, Valve-seat. *l*, Removable cover. *n*, Valve-crank.

Carr's Side-Outlet Valve-Closet. — W. S. Carr received letters patent in this country for a closet similar to the French closet in the arrangement of the valve and the weight which holds it in position.

Doulton's Trapless Closet. — Probably the best of this type, and I

think the best valve-closet, provided it has a siphon-trap below it, properly vented, is the "trapless" closet manufactured by Doulton & Co., Lambeth, London. This closet has a flushing-rim that gives an equal distribution of water to all parts of the bowl, by means of small holes in the rim which encircles the top of the bowl. The manufacturer says: "The construction of the closet renders the usual complication of levers, both for the supply and discharge valves, unnecessary, as both are worked from the same spindle with direct action at each end, a very small weight being necessary to render the discharge-valve tight." There is a metal rim for the valve to fit against, while the valve has a yielding substance such as rubber where it comes in contact with the seat, and an earthen face.

The overflow from the bowl to the valve-compartment is sealed by a U-trap. The bowl is furnished in different ornamental patterns and attached to an iron receiver or valve-chamber by means of bolts. The perspective view shows the simplicity of the mechanism. The hand-pull is connected to the spindle, which turns the valve by a slotted crank. The weight which holds the valve in position is attached to the lower end of the pull-rod. The valve-chamber of this closet has a large vent-pipe, and a cover held on by screws that may be easily removed for the purpose of cleaning out this compartment. It is important that these inspection-covers should fit air-tight; when once removed, they are generally put back in a careless manner, and in the case of a trapless closet this would allow free communication between the soil-pipe and the house. Doulton's closet can receive its water directly from the water-main, through his patent supply-valve; or it can be flushed from a cistern, through a pipe with an inch and a quarter diameter.

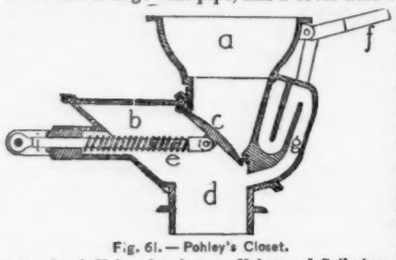


Fig. 61.—Pohley's Closet.
a, Bowl. *b*, Valve-chamber. *c*, Valve. *d*, Soil-pipe. *e*, Spring. *f*, Lever. *g*, Overflow. *i*, Rod.

Pohley's Closet.—In this country, in 1877, a valve-closet of this type was invented by F. Pohley. The valve is held in its place by a spring that encircles the rod by which the valve is drawn back or held in position. The valve, of metal, fits against a pliable band which is let into the bottom of the bowl. The valve is opened by an L-shaped lever, and the bowl has a simple siphon overflow.

Tylor & Son's Valve-Closet.—Tylor & Son, of Newgate Street, London, invented, in 1878, a closet in which the valve opens in the same direction as the closets described above. The outlet to the bowl is at the bottom; a projection from this opening turns at right angles or forms a quarter-bend, and on the end of this projection the valve finds its seat. The overflow enters the valve-chamber immediately back of the valve, and is sealed by dipping into a box formed in the receiver. The valve with a "rubber or other suitable material, washer closes against the brass or other metal valve-seat." This valve-seat is clamped to, and made to project beyond the bowl, as shown in the detail cut.

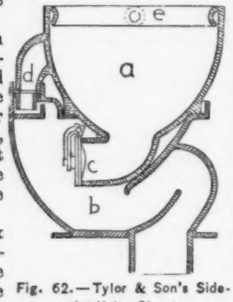


Fig. 62.—Tylor & Son's Side-outlet Valve-Closet.
a, Bowl. *b*, Trap and receiver. *c*, Valve. *d*, Overflow.

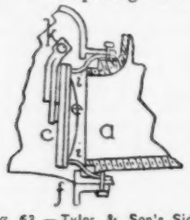


Fig. 63.—Tylor & Son's Side-outlet Valve-Closet.—Detail of valve.
a, Bowl. *c*, Valve. *e*, Earthenware face. *f*, Yielding washer. *i*, Metal seat. *k*, Spindle.

The type of valve-closets which I have last described has an advantage over other closets of this class, as well as over plunger-closets, in the position of the valve and its chamber. The waste matter passes directly into the soil-pipe without passing through the valve-chamber proper, as it does in other closets of this class, and the water does not stand in this chamber, coating it with foul deposits, as is the case in plunger-closets. With this form of closet there is very little opportunity for the back of the valve to become foul, as neither the water nor waste matter ever reaches it.

Fig. 64.
Early French Valve-Closet.
a, Bowl. *b*, Receiver. *c*, Valve

At the present day Doulton & Co.'s "trapless" closet and Bean's closet are used in Great Britain, while Dummis's is used in France. There are no closets of this type manufactured in this country, and none in use, unless a small number of the English closets have been imported for parties who have been pleased with their construction.

VALVES THAT OPEN DOWNWARD.

I now come to the last type of valve-closets, and this form of the class has been in use since the beginning of the eighteenth century, with slight variations in the arrangement of their mechanism, and in the materials used in their construction. These closets, in which the valve opens in a downward direction from the bowl, have their prototype in the Bramah closet invented more than a hundred years ago. English manufacturing firms, notably Tylor & Son, Underhay, and Jennings, manufacture closets under that name at the present day. Doulton & Co. manufacture a valve very much like the Bramah, adding a weight to the end of the lever, which moves the valve, and a vent-pipe to the receiver.

Early French Valve-Closet.—Liger gives a description of a closet of this type which was first brought into use in France about the year 1823. This closet had a metal valve which was intended to fit tightly against the bowl. The valve was connected with the hand-pull in the simplest manner, by means of a short hinged arm. Judging from appearances there was no weight to keep the valve in position. The pull-rod and connecting arm were both within the receiver. The opening where the rod passed through appears to have received special attention.

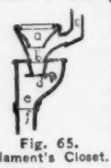


Fig. 65.
Flament's Closet.
a, Bowl. *b*, 1st Receiver. *c*, Vent. *d*, Balance-valve. *e*, 2nd Receiver. *f*, Soil-pipe.

Flament's Closet.—Another closet used in France was invented by M. Flament. The bowl, with a flushing-rim, is set directly into a hopper or receiver. This hopper has a large vent, which is intended to run into a warm flue, if one is convenient; otherwise, into the outer air with a ventilating cowl on top, M. Flament designing a cowl in connection with his closet. At the bottom of this receiver, having a seat on a projection therefrom, is a balanced valve that works in a second receiver or valve-chamber. The valve is hinged, and on the side of the hinge opposite to, and forming a part of the valve, is a weighted projection that would cause the valve to rest firmly against its seat. When the first receiver has become filled or partially filled with water or excrementitious matter, the balance of the valve would be overcome and the waste matter dropped into the second receiver and soil-pipe. In the cases mentioned above, the valve is intended to keep disagreeable odors from entering the house. They are not intended to be placed over a siphon-trap.

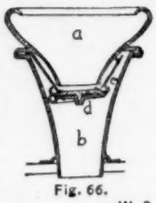


Fig. 66.

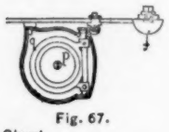


Fig. 67.
W. S. Carr's Closet.
a, Bowl. *b*, Receiver. *d*, Valve. *e*, Overflow. *f*, Lever.

The following closets are almost without a single exception in common use at the present day in different parts of the world.

Carr's Valve-Closet.—W. S. Carr, of New York, invented a simple valve-closet of this type in 1868. The bowl is set in a small hopper and the bottom of this hopper forms the valve-seat. The overflow is in the space between the hopper and bowl. The valve is held in position by a weighted lever. The inventor made some improvements on this closet in 1875, calling the improved closet the "American Defiance Closet." The novelty consisted in having the bowl and overflow made in one piece of earthenware, which is bolted to the receiver. The receiver is enamelled, and the part of the valve that shows in the bowl is also made of earthenware, closing against a rubber packing. Prof. T. M. Clark described this closet fully in his articles on Modern Plumbing. Henry Huber & Co. now manufacture this closet with an opening at the top of the overflow for a vent-pipe, and they also furnish the bowls with a vent-pipe from the closet bowl. (See *American Architect*, August 31, 1878.)

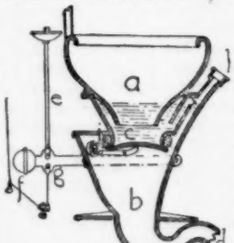


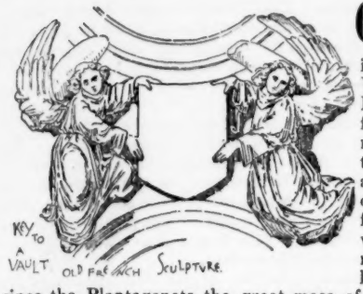
Fig. 68.—Peter's Closet.
a, Bowl. *b*, Receiver. *c*, Valve. *e*, Hand-pull. *f*, Weighted lever. *g*, Wires to tank. *h*, Vent to overflow. *i*, Rubber-ring (valve-seat) *k*, Trapped-overflow.

Peters's Closet.—Messrs. Peters & Donalds, of Glasgow, Scotland, manufacture a valve-closet in which the valve opens downward. The bowl of this closet is set in a small hopper which is placed above and forms a part of the receiver. The trap or water-seal to the overflow in this case is double, and has a vent-pipe from the crown of the trap, which would prevent the trap from being siphoned by the discharge from the bowl.

J. Bailey Denton considers this one of the best closets in use, and in describing it says: "The valve arrangement of this closet is composed of a brass disc which is closed against an india-rubber ring by means of a projecting arm cast on a spindle. By this arrangement, the patentee states, the disc is closed perfectly tight against any uneven surface which at any time may present itself. The valve is held in position by the simplest form of weighted lever, while the supply-tank is connected with the closet by means of wires and bell-cranks, motion being imparted to both at the same time by the hand-pull. The trap, which is under the floor and formed in one piece with the receiver, is not vented. Letters patent were issued for the above closet to Peters & Peters, in 1871.

Bird's-eye maple, which sells for $150 per 1,000 feet in England, is used for firewood in North Carolina.

THE ENGLISH LAW COURT BUILDINGS, OLD AND NEW.



ON the fourth of last December, in a formal leave-taking of its separated abodes in Westminster Hall and Lincoln's Inn, and in a formal entrance into the new Royal Courts of Justice, on the Strand, the ancient judiciary system of England received such fresh impulse as an outward change of vesture may exert upon the inner life. "For the first time since the Plantagenets the great mass of judicial bodies are now consolidated in a visible unity;" for the first time since the Norman kings, the sovereign will hold state in the Royal Court as the manifest head of the judicial power, the executive force, and the legislative authority. The Courts of Justice have deserted historic buildings by the change: Westminster, the noblest hall left from the great architecture of the Middle Ages, and that of Lincoln's Inn, the most perfect hall of the Renaissance, the exquisite work of the days of Elizabeth, the only remaining building where a play of Shakespeare was performed before the Queen, the Court, and the author's contemporaries.

The old Law Courts at Westminster, of which Sir Edward Coke says: "No man can tell which is the most ancient," were on the west side of the Hall; *were*, for they are now almost entirely taken down. They were ten in number, and were contained in the Italian-fronted building constructed after designs by Sir John Soane. It was in one of them, the Court of Common Pleas, that the Tichborne case was tried in 1871–1872.

Westminster Hall, from which each of the courts had an entrance, has a door on the east which forms the members' approach to the House of Commons; it leads into the fan-roofed galleries which represent the restored cloisters of 1350. The Hall, which was first built by William Rufus, as every one knows, is merged in Sir Charles Barry's huge building of the House of Parliament, or, more correctly, the New Palace of Westminster.

We find that until the reign of Queen Mary the judges rode to the Courts of Westminster on mules, and that men used to walk about the Hall seeking employment as witnesses, who unblushingly drew attention to their calling by a straw in their shoes; so that the traditional dignity of the law appears to have been preserved to us in the face of outward disadvantages. The old law buildings of Westminster were but dingy places for the Goddess of Justice to have held her court through all these years — places devoid of magnificence, grandeur, dignity, or even cleanliness, although, as the lady's attention is given with some show of interest to a pair of scales, and she is further encumbered with a bandage over her eyes, it may be presumed that she is spared a housekeeper's worry about her surroundings.

The Courts of Lincoln's Inn have been consecrated to the legal profession for five or six hundred years, but previously the spot is associated with the Earls of Lincoln and the Knights Templars. None of the buildings which remain, however, are earlier than the Tudors, the old gateway and hall having been built in the reign of Henry VII. The frontage of these ancient buildings on Chancery Lane is about five hundred feet. The gate-house is a fine specimen of late red brickwork of a Gothic type, almost the only example of the kind in London. The old hall has a monastic appearance, with its buttresses and pointed windows. In 1819 it was lengthened by ten or twelve feet, and an ugly modern ceiling was substituted for the fine, open roof of oak, which was removed, or possibly concealed.

Half a century ago there was great dissatisfaction with the administration of justice in two places at least a mile apart, and with the loss of time to judges and counsel which was involved. With a view to a remedy we find that Sir Charles Barry, as early as 1841, designed a vast building, of Grecian architecture, which was to have been erected in Lincoln's Inn Fields. It would have had a large hall about equal to Westminster Hall, round which were to have been clustered twelve smaller courts. Fortunately, however, neither funds nor public approbation assisted the plan, which would have blocked up an open space in that part of London where space is rare, "The Fields," which, although enclosed, are to the crowded district like a glimpse of the country. The subject was frequently alluded to in Parliament, but nothing was done until 1858. In that year a Royal Commission recommended a site, but Parliament threw out the bill. In 1865, however, both the site and the funds for the buildings were provided for by two Acts of Parliament, judges of designs were nominated, and a limited competition among the best architects was instituted. The designs were exhibited to the public in 1868, in a temporary building erected for the purpose, and finally the plan of Mr. George Edmund Street, R. A., was selected. Then there was a further delay, for many people, the successful architect among them, expressed the opinion that a space between the Strand and the Thames Embankment, to the east of Somerset House, would be preferable, the ground having been cleared during the preceding two years by the removal of as many as thirty close and ancient courts, alleys, lanes and yards, which had fallen into the lowest estate. The suggestion was acted upon, and thus the first brick of the "Law Courts of the Future" was laid on the last day of April, 1874, on this latter site, where the magnificent buildings now stand, on the place where lived long ago the fashion and genius of old London; where was the residence of Sir Edward Littleton, Lord Chief Justice, and near by that of the widow of Sir Walter Raleigh; where Oliver Cromwell's early days were passed; where Steele and Bolinbroke, and Pope walked in St. Clement's Lane; where scowling Swift and gentle Addison passed each other in the narrow streets; and where the pilgrims to the shrine of à Becket, at Canterbury, paused for rest at St. Clement's Well.

About eight acres were cleared: the law buildings occupy about six and a half, the remainder being left for the present an open space, which is to be laid out as a garden. The Courts are built in the Decorated or Second Pointed style, and they form a somewhat irregular square; the Strand front being four hundred and eighty-three feet, and the depth about four hundred and sixty feet. The entire pile of buildings is divided into two blocks, the eastern is the lesser one and the larger the block to the west, both fronts being relieved by dwarf towers, arches and other features, while there are two high towers, the one at the southeast angle being one hundred and seventy feet in height; so that the idea that the structure would meet the need which existed of a marked architectural feature in the long expanse of buildings between St. Paul's and Westminster, an idea which was suggested in 1869 by its late designer, will be well fulfilled.

The whole edifice is three, four and five stories in height in different parts. The general height of the building to the ridge of the roof is ninety or ninety-five feet, the Central Hall rising over the rest. This hall is one hundred and forty feet to the top of its roof, or ninety feet measured inside up to the crown of its ceiling.

There are nineteen courts, each with its own entrance and staircase, with separate approaches and doors for judges, jury, the bar, and the public, together with rooms for clerks, secretaries, and registrars, and also waiting-rooms. The Court of Appeals will have two courts: Appeal Court I, and Appeal Court II. Another will be called "The Lord Chief Justice of England's Court," in which Lord Coleridge will sit. Nine will be named "Queen's Bench Court I," II, and so on; four will be Chancery Courts and similarly numbered; two will be appropriated by the Probate, Divorce and Admiralty Courts, and the remaining one will be called "The Lord Chancellor's Court."

There are of course grumblers among the critics, who think the ventilation imperfect and who complain that the courts are ill-lighted, not to mention people who are quick to see comparison between the winding passages and the tortuous processes of the law. But whether perfect or not, the buildings are finished whose floors will be worn by the weary feet of many generations of litigants.

On Monday, the fourth of last December, these Royal Courts of Justice were formally opened by the Queen. The day was kept in London as a public holiday. The time was fixed for noon, but two hours before the judges assembled in the Prince's Chamber of the House of Lords, took breakfast together in the Peers' Dining-room, and returning to the former room they walked in stately procession, headed by the Lord Chancellor's secretaries, the mace-bearer, and other officials, robed and carrying the symbols of their office, and passing through the Division-lobby, the Peers' corridors and St. Stephen's Hall — the Lord Chancellor, the Lord Chief Justice and the Master of the Rolls singly, the others and the Law officers of the Crown two and two — they went down Westminster Hall, between the close lines of people who were standing in utter silence. It was the dignified leave-taking of that place, memorable for great interests to the subject and to the State.

At noon the Hall of the new buildings was filled with a distinguished audience. It compared unfavorably with Westminster, being less spacious, less noble, but still imposing. Its vaulted roof, its lance-head windows and its length and height suggested the nave of a cathedral. The central aisle is two hundred and thirty feet long by fifteen feet broad, down which the grand procession walked; the audience standing respectfully, their brilliant state dresses adding to the gala appearance of the Hall, which was hung with crimson.

The procession was headed by the architect and builders, and after a few officials came the Queen of England and the chief dignitaries of the kingdom. The ceremonies began punctually, the keys of the building were given and received after the usual manner; the set speeches were made; Sir William Harcourt announced that the Queen commanded him to declare the Royal Courts of Justice open. There was a flourish of trumpets, a great cheer from the people, and the event was over. The buildings were exhibited to the public from Monday, December 25, to the succeeding Friday, and sixty-three thousand two hundred and thirty-two persons visited them. The Central Hall will only be accessible on certain days in vacation, to sight-seers, hereafter.

The only change at Lincoln's Inn will be the absence of the judges; it will be left to the lawyers as it has been for centuries.

The bricks, timbers, roofs, floors, oak-wainscoting, seatings, all the materials of the shabby old law-courts of Westminster have been sold at auction, and before Parliament meets the ground on which they stood will be clear.

M. G. M.

THE WATER-COLOR EXHIBITION, NEW YORK.

It is high praise to say that this year's exhibition was as good, even if no better, than was that of a year ago. For every one will remember how far ahead of all its predecessors was the collection of 1882. This season few drawings, perhaps, rose to an exceptional height of interest above the general average; but that average was very good — wonderfully good if we look back to a distance of even five or six years—and comparatively few essays fell painfully below it. And there were certainly some pictures that were remarkably and exceptionally fine — that would have been marked drawings in any exhibition in the world.

The hero of the hour was unquestionably Mr. Winslow Homer. For once every one whose vote told for much gave it for the same candidate. The artistic brotherhood at the preliminary reception and the newspaper men in the journals the next morning broke into a chorus of approval, and the public, having thus had a good thing pointed out to it, seemed not far behind in its appreciation. The fact is the more significant of the absolute worth of Mr. Homer's work since it had absolutely no "prettiness," and very little "charm," since it lacked, moreover, both the perfect technique, which appeals to the critical, and the anecdotal interest which attracts the popular eye. Mr. Homer has always been one of the very strongest and most original among American artists, though some times one of the most unpleasing. Versatile he has shown himself as well, and of late his changeful moods have led him in the direction of greater beauty and artistic interest. The splendid, vivid, almost infernal beauty of the numerous marine sketches he exhibited at the Water-Color show of 1881 will be long remembered. They were an immense advance upon the angular figures in raw green landscapes he had more often shown; but this year—after an extended stay in the coast countries of England — he shows himself a still completer and more powerful workman. His four pictures were no longer sketches or studies, but pictures in the truest sense of the word. Their especial excellence lay in their composition — in the linear beauty, almost statuesque in character, he gave to his rustic figures, in the way he supported these by the linear grace and strength of his landscape backgrounds — and in the dignity, and the original force and fervor with which he infused every inch of his work. His color is still most peculiar — not often attractive, though sometimes impressive, and never untruthful within the limits of the chosen scale. The color of a smooth, heaving sea under sunset light in a large marine called "Teignmouth" was, seen from a proper distance, quite beautiful. And the vigorous, stormy grays of his windy skies were superb in tone no less than in transparence and movement. Where he sinned was chiefly in his flesh tones, usually of an unpleasant purplish hue. Two pictures showed each the single figure of an English fish-wife set in a wide, cloudy, windy, savage stretch of coast land. Another was called "A Voice from the Cliffs," and showed the three-quarters-length figures of three fisher-girls listening with parted lips to some distant sound. To say that each and all were individual conceptions is implied in the fact that they were painted by Mr. Homer—for he has never at any time done a stroke which could have been credited to any other man; but their further excellence is not so easily told. It is hard to describe how these rustic figures, without being "idealized" in either form, feature, expression, or attitude, had yet been subtilely adapted to artistic purposes, so grouped, posed, and rendered as to have a linear beauty of the most rare and valuable sort. To say that Mr. Homer has gained the power to compose and draw figures which, while perfectly fresh and unstudied in effect, yet might be transferred without alteration by a sculptor to a bas-relief, is certainly to say that he is a very different Homer from the one we knew in days gone by. Yet this is not, I think, an exaggeration of the truth. It was interesting to examine the way in which this statuesque grace had been obtained—to find resulting from such an arrangement of the figure, (where more than one was in question) that the lines of one should support and almost duplicate the lines of the other, producing simplicity without monotony, harmony without rigidity. They were more than fine, these pictures of Mr. Homer's. They were powerful, both in their originality, and in the sort of dignified beauty they secured. Everything else in the rooms, almost, was killed by their strong presence — was made to look either weak, trivial, commonplace, shallow, affected or insipid. A hundred men could put on their color more skilfully than Mr. Homer. Not one had found something so new and individual to say; not one had infused his message with so much artistic force; few had been prompted by so much fervor and truly creative passion.

But it would have been hard for any one, even Mr. Homer, to take the strength out of Mr. Currier. His themes were not so interesting, and his vision not so individual. But his feeling had been as intense, and his technical work was far superior, of course, to Mr. Homer's. He sent from Munich a number of landscapes, some of them very large in size, and more in the nature of complete and balanced pictures than anything he had hitherto shown us in water-color. The sketches of moorland and of sunset skies he contributed two years ago were little more than brilliant memoranda of effects of wind, and light, and color. This year's pictures seldom sought for such gorgeous coloring or so much movement, being forest or village views pitched in a low key, the details very large in scale, but treated still in the most bold and summary way. They were immensely powerful and individual—attractive in spite of their contempt for all "prettiness," or even charm. One especially—"A Street in Schleissheim"—with a long beautifully-rendered perspective of houses and trees, and a canal toward the left, was a superb piece of work. Mr. Muhrmann is a worker in the same direction, but with a very distinct individuality of his own. His landscapes and figure studies were alike forcible and fresh. Mr. Mente, on the other hand, with similar aims, shows far less of strength and of true personality. He is a sort of diluted Currier, while Mr. Muhrmann is a colleague of Currier's who stands firmly on his own feet.

A noteworthy and promising feature of the exhibition was the greater number of figure subjects it showed — largly in excess it seemed to me, of those in any former collection. Mr. Kappes's *genre* scenes of negro life were very strong and true in character, full of humor, and good in handling and in color—quite complete in their own way. Mr. Blum was in strong contrast to the local "realism" of Mr. Kappes with his delicate, "impressionist" Venetian groups and a brilliant little dancing scene in a Spanish café. Mr. Lungren sent from Paris a number of large street views cleverly eccentric in composition. His handling is almost as free and spirited as Mr. Blum's, and he seizes a general effect with almost as much freshness and sparkle. Where he falls decidedly behind his friend is in a most vital point—in his power to give character, individuality, expression to the slightly touched little faces he portrays. In this respect Mr. Blum's talent is quite remarkable. Mr. Turner sent some large and accomplished if rather insipid groups; Mr. Chase, a very clever study of a girl in black, and Mr. Lippincott, two quite admirable studies of women's heads. In strong contrast to all this peculiarly "modern" work in which French influence is so strongly visible, were two large and careful pictures by Mrs. Stillman, who, as Miss Spartali, was formerly known as one of the most promising pupils of the Pre-Raphaelite school, under the tuition of Madox Brown. The more important of the two represented the meeting of Dante and Beatrice, and was a large drawing with a number of figures. It was interesting to some, I dare say, even in these alien days, for its own intrinsic qualities, and it was interesting to all who care anything for the history of art and its various movements and developments, because it was so entirely typical of the better products of its peculiar school. It had the usual faults and the successes which are sometimes attained but are perhaps less usual. The grouping was very good, the color ambitious and not without beauty, the handling extremely detailed yet not quite fatally labored, the drawing a little out (in the background especially) and the modelling often conspicuous by its absence. The sentimentally-sweet type of face was of course disagreeable to eyes that care for reality and strength, but to others may have seemed most charming. Such a picture looked very archaic in this year of grace 1883, and it was hard to realize how short a time it is since the Pre-Raphaelite was the youngest and most eagerly alive of all artistic schools. Mr. Newell and Mr. Smedley sent some good figure drawings of local subjects, and Mr. Abbey and his English friend, Mr. Parsons, had painted in collaboration a landscape with figures that was one of the most valuable things in the collection — a good corrective after so much Homer and Currier and Muhrmann, as showing that delicate refinement is not of necessity weakness, and that loving elaboration need not always result in confusion, or in loss of unity, of breadth or of repose. Mr. Bolton Jones taught the same lesson with almost equal grace and skill in a charming winter landscape, one of his familiar New Jersey views. Mr. Shirlaw's studies were as strong as ever and had much affinity with those of the Munich artists already mentioned. With less of strength than Mr. Currier, and less of almost aggressive individuality, Mr. Shirlaw had, perhaps, much more of charm. Mr. Tryon has a touch of poetry at his command when he does landscape work, from which the best things may eventually be hoped. Mr. Gifford and Mr. Farrer and Mr. F. S. Church are among those who deserve much more extended criticism, yet of whom I have only space to say that they were, if anything, above their usual level of interest. But Mr. Alden Weir's little flower pieces must not go unmentioned — exquisite, dainty bits of work in which the spiritual aspect of the blossoms, so to say, and not their decorative possibilities, had been insisted upon. No one but Mr. La Farge has ever painted flowers for us in just this poetic spirit, and it would indeed have been interesting could we have been given a bit of his work to put beside Mr. Weir's. The other flower subjects seemed prosaic enough by contrast — the best being the large and finely decorative studies of Miss Greatorex.

The Etching Club exhibited, as was the case last year, in connection with the Water-Color Society. Its collection was not very large but contained much interesting new work. Mr. Gifford's long, narrow plate with a Dutch windmill as the subject was to my mind the most perfect among the home productions. Mr. Platt does better month by month and perhaps he is destined, as I hear Dr. Haden predicts, — though in view of certain recent utterances we can hardly accept Dr. Haden's as a sibylline voice — to grow into the best and most original of our American etchers. Mr. Parrish's immense plate

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CARL PFEIFFER,
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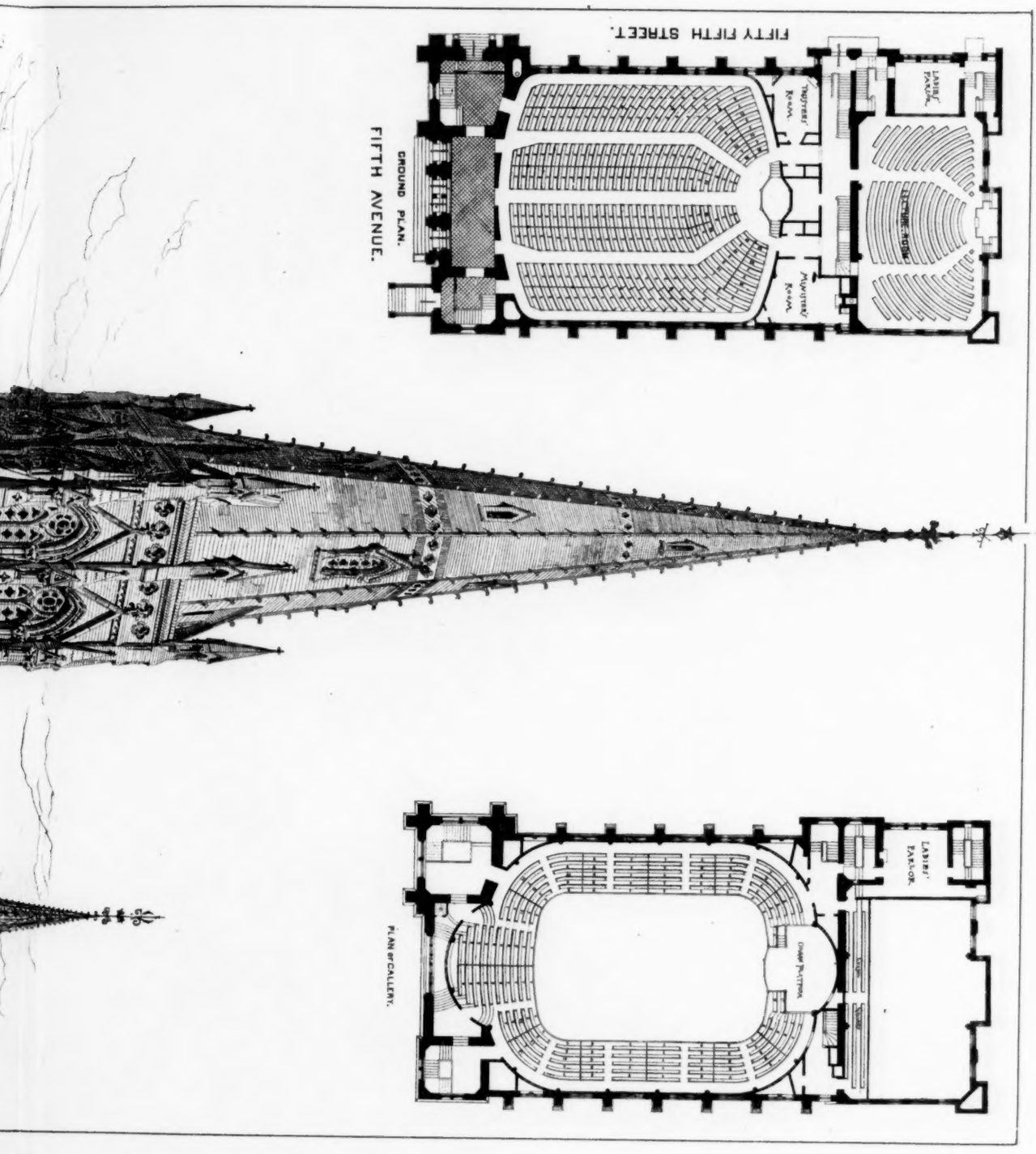

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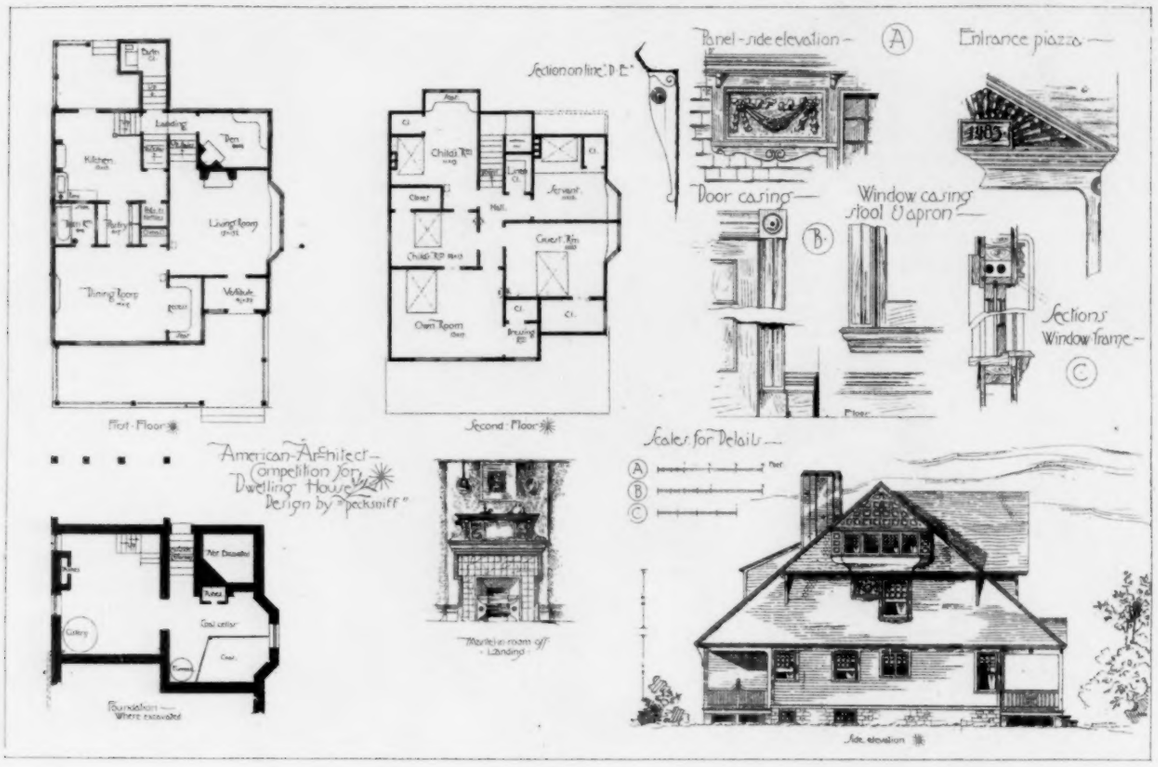

Heliotype Printing Co. 211 Tremont St. Boston

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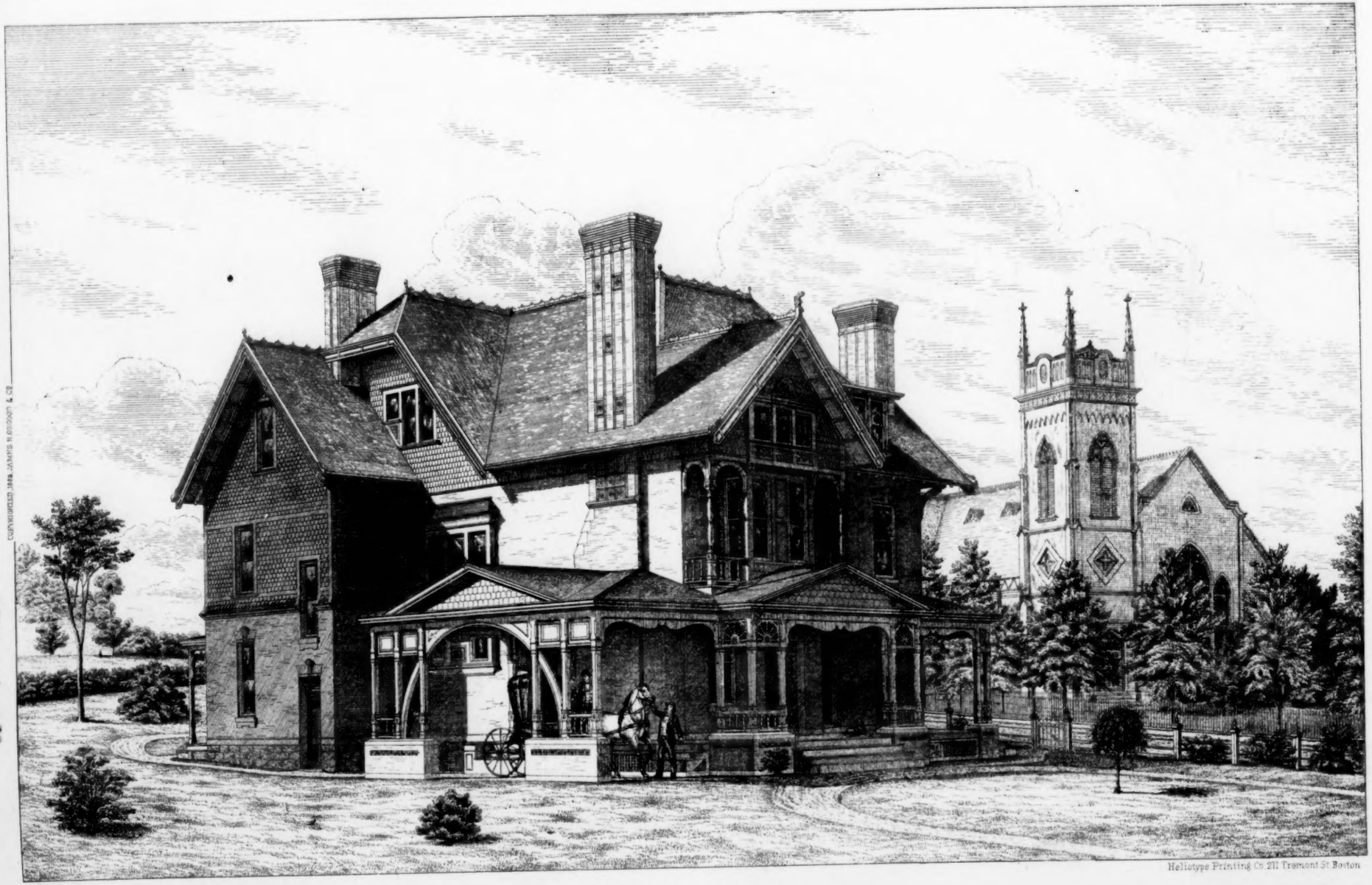


Heliotype Printing Co. 211 Tremont St. Boston

Geo. S. Orth, Arch't.
Pittsburgh.

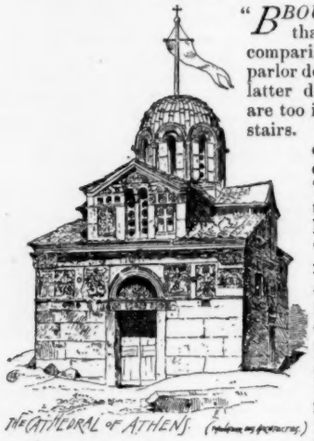
Proposed Residence for Rev^d W. J. Holland,
5th Avenue, Pittsburgh, Pa

with a scene from the New Brunswick coast was a triumph over material difficulties, but in certain artistic qualities — in composition and unity of effect for instance — was inferior to some of his works that are more moderate in size. Mr. Pennell was as charming as ever, Mr. Thomas Moran as delicately pyrotechnic in his effects of light, and Mrs. Moran, with her views in England and Wales done during the past summer, almost as strong and fascinating as in the Long Island scenes she did a year or so ago. Of course among the foreign etchings there were some by Dr. Haden, and there was also a huge plate by Haig, a view of Mont St. Michel, splendid in color and chiaroscuro, but almost too panoramic in subject to be thoroughly successful from a pictorial standpoint.

M. G. VAN RENSSELAER.

THE LATE AMERICAN ARCHITECT COMPETITION.

REPORT OF THE JURY. — II.



"*BBOUL'S*" plan is remarkably like that of "*Bumpkin*," but suffers by comparison with it. The dining-room and parlor do not communicate as those of the latter do, and upstairs the chambers are too isolated, and there are no back stairs. Nevertheless, the plan is one of the best presented for a dwelling for all the year round. The attic is well utilized, and the basement fitted up for a laundry and water-closet. "*Bumpkin*" has worked-in four rooms at a little additional cost, and "*Bboul*" could probably do the same if desired. Of the elevation nothing but praise need be said. An almost quaker-like simplicity, combined with a bold accentuation of the sky-line, gives at once a refined distinction to the design, which gains much also from its excellent proportions, and from the well-balanced relation and distribution of the window openings. From the economical side this design offers a reliable solution of the problem, and could be carried out with every indication of the owner's ultimate satisfaction. The drawings are neat and pains-taking, yet with no lack of artistic sentiment. This careful drawing from a skilled hand is a pleasing contrast to the wanton neglect shown too often by facile and brilliant draughtsmen.

"*Convenience*" in plan resembles "*Danfors*," but is inferior in the arrangement of the roof and the lighting of the second-story hall. The admirably-arranged ground-plan calls for little criticism. Parlor and dining-room are made to open well together. Kitchen, china-closet, back-hall and its entrance find appropriate positions. The value of the house would, however, have gained largely, at a small additional cost, had a fireplace been put in the dining-room: it could have connected with kitchen chimney. The chief defect in the plan is the sacrifice made to obtain a striking effect by narrow slits *en échelon* upon the stairs; these, however, are quite insufficient to light the upper hall near the bath-room. An enlargement of these windows would fulfil their purpose without detracting from the merit of the exterior; this lies chiefly in an unusually broad treatment, which would at once distinguish it from more pretentious and less artistic neighbors. The drawings are carefully presented, but the side of the building in shadow should have more indications of reflected lights in the planes at right angles to each other. The honesty of the design, and the absence of all meretricious effects of rendering are a guaranty that in execution the house would not be a disappointment. The schedule is also one of the most reliable submitted. It should be noted that "*Convenience*" has falsified the relative size of his building by the tree on the left, which is on much too small a scale.

"*Oliver Twist's*" plan does not differ materially from the preceding one except that a servant's room is provided on the ground floor; this is a costly addition, the cellar and trench wall much exceeding in cost what would be required to slightly raise the main roof enough to finish an attic chamber. Two or three feet taken from the veranda would have completed the vestibule suggested, and insured further comfort in winter. The elevation is picturesque and ingeniously varied by simple devices, and the arrangement of the windows on the stairs is interesting. There is the less need of the servant's room in that there are four chambers on the second floor. A door from large to small chamber has been wisely provided. This has been very generally omitted in some of the best plans, to their loss. The drawings are presented in a sketchy way which narrowly escapes being careless. We are sorry to see that "*Oliver Twist*" rates his commission at $125. If worth anything, he is entitled to more than that.

"*Spring Chicken.*" Very good scheme; simple and economical in plan, and the exterior judiciously treated. The parlor and dining-room and kitchen grouped about the same chimney, which, however, is not made use of in the second story. The dining-room can only be reached through the parlor, which defect is mitigated by communication from kitchen to front-hall. Back stairs done away with by using the front flight, which thus cannot be left with an open balustrade into hall, but ascends between solid walls. Bedrooms well arranged, and bath-room placed properly over kitchen. Closets too large for size of house. The attic stairs, chambers, and tank disposed so that not a foot is wasted. The details are good and the drawing crisp, with, however, a dangerous tendency towards coarseness. To sum up, a capital solution of the problem from the most economical point of view.

"*Home*" (published February 3, 1883) has a good plan, which a little more study would easily raise to one of the first places in the competition. With the plainest of square plans its author has managed to group around one central chimney his parlor, dining-room, kitchen and large hall in a way which is novel and attractive. Having a vestibule, the hall could be made, even in winter, a comfortable room, and its corner fireplace and stairway give it at once a picturesque character. The free circulation in this floor is an excellent point. A good deal of thought and ingenuity is shown in the various flights of stairs, and in taking advantage of the lower stud of the kitchen. The kitchen pantry, however, is clumsily cut out of the kitchen, while upstairs valuable room is lost in getting devious access to the chambers. The stairs to the attic might be better placed to avoid the steps down into the guest room. These defects could all be remedied, and the plan would then become one of the most attractive, as it certainly now is one of the most economical. The exterior is just saved from indications of this extreme economy by its generous bay and overhanging gable. The estimates are unusually reliable, but as a bath-room may be considered a necessity, at least $100 more should be added. This competitor has boldly struck for six per cent commission, and in view of his careful study and forethought this would be no loss in the end to the owner of the house.

"*Joanna*" (see *American Architect* for February 17) is gifted with a turn of mind more practical than artistic. His plan is good, the circulation well established, and but for the inconvenience of the servant having a roundabout way to go up stairs, calls for nothing but favorable criticism. Upstairs also all goes well; there are four bedrooms and one in the attic. But it would be difficult to find an uglier elevation. From all points of view and in all details there is a determined ugliness which is startling. Gambrel roofs are most difficult to manage and here the effort to combine one with the projections and "overhangs" which belong to a lighter and more irresponsible style has been an entire failure. The gambrel's somewhat ponderous dignity presides with honor over a plain rectangular plan, but admits of no jaunty graces, and much more skill and sense of picturesqueness than "*Joanna*" shows would be required to reconcile the inharmonious elements introduced into this design. The drawings show a free and experienced touch.

It is unfortunate that "*Si quaeris*" did not respect his ideas sufficiently to treat them seriously. To the jury they seemed worthy of more honorable treatment, and anything but such contemptuous sketch-plans would have entitled their author to a prominent rank in the competition. The disposition of ground-plan is excellent; the hall large and airy for summer, and protected by a vestibule for winter; chambers equally well-disposed. The perspective is brilliantly sketched in, but without regard to the plans, apparently. The kitchen chimney disappears entirely in the second story, but reappears in a picturesque position in the perspective again. A *porte cochère* is an excellent thing — when one can pay for it — but this competitor is the only one who has ventured to show one; however as he holds his sketches cheap, he may hope to find a builder as reckless. Judging from the sketches — no elevation is vouchsafed — and by the item of $200 for mantels, this design contemplates an expenditure beyond our limits.

(To be continued.)

THE ILLUSTRATIONS.

FIFTH AVENUE PRESBYTERIAN CHURCH, NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT, NEW YORK, N. Y.

THE church is located at the northwest corner of Fifty-fifth Street and Fifth Avenue, fronting 200 feet on the former and 100 feet on the latter street. The front on Fifth Avenue is flanked by two towers varying in size, that at the southeast angle being 30 feet square at its base and rising with its spire to a height of 300 feet above the sidewalk, which is about 14 feet higher than the spire of Trinity Church. The tower at the northeast angle is 160 feet high. The main entrance, consisting of four double doorways, lies between these two towers, and is approached through a porch or narthex, 40 feet front, with stone steps leading from the court-yard on Fifth Avenue.

In addition to the main entrance there is an entrance in the northeast tower on Fifth Avenue; also in the main tower, corner of Fifty-fifth Street and Fifth Avenue, and three entrances, all double doorways, in Fifty-fifth Street, at the westerly end of church, which also afford access to the lecture and Sunday-school rooms. The ample width and number of the doorways give a ready and easy means of ingress and egress for a large congregation. The front on Fifty-fifth Street has a tower at the westerly extremity 106 feet high. There is also a tower at the northwesterly corner of the building 100 feet high, which serves as an air-shaft to supply the church with

fresh air; the air is purposely taken at the top of this tower in order to have it pure and free from dust. The principal entrances on Fifth Avenue lead into a vestibule 45 feet 7 inches long and 16 feet 6 inches wide. The ceiling is formed of groined arches, enriched with moulded ribs, foliated bosses, etc., and supported upon columns with sculptured caps. The floor of this vestibule and those in the two towers are paved with Minton's tiles. The auditorium is 100 feet deep on the main floor, 136 feet deep on the gallery, 85 feet wide, and the ceiling 60 feet high. It will have comfortable seats for two thousand persons. It has been the aim of the architect here to produce a building which should first be a perfect auditorium, based on the most scientific principles as to facility for hearing and seeing; and second, one which should be thoroughly substantial, dignified, and ecclesiastical in its architecture.

The style of the exterior is Early English, but for the interior a more modern treatment has been adopted. It has also been his object to combine with these requirements all those appliances which modern science has evoked, to meet the exigencies of the climate, and to secure for each worshipper the utmost comfort in respect to such matters as heating, lighting and ventilation. The auditorium has no sharp corners or angles, the ends being semi-circular and joined to the side walls by elliptical curves. The pews are arranged on concentric curves, all placed so as to command a direct view of the minister. The ground floor and galleries are also inclined for the same reason, following in that respect the form of the "isacoustic curve," which has been mathematically and experimentally demonstrated by Scott Russell, and other authorities, as the best form for hearing and seeing. The pulpit is of generous dimensions and of rich design; the central panel has a beautiful piece of sculpture, allegorically representing the four evangelists and the holy communion. There is a canopy over the pulpit of ornamental work, and above this the gallery for the precentor, choir, and an organ of first-class dimensions and power.

Except light iron columns to support the galleries, there are no pillars to obstruct the view. The ceiling is formed on three curves, rounded at each end to conform to the curves of the walls, and entirely constructed of wood, handsomely finished with panels, moulded groining ribs, and corbels. The lower curve of the ceiling extending a great depth down on the side walls, and the wainscoting being very high, leaves very little space for plastering. This was done to increase the acoustic properties of the auditorium.

The lighting is effected through twenty-four lofty traceried windows over, and twenty-four smaller under the galleries, and an elaborate traceried window in the east end. In addition to this, the entire upper cove of the ceiling, 35 feet wide by 75 feet deep, is filled in with stained glass and lighted from the roof by skylights. The ceiling and windows are glazed with the best quality of rolled cathedral glass. All the windows have double sashes, an inner and outer one, so as to secure complete immunity from external sounds, and also affording an opportunity of lighting the church in the evening by means of gas-lights placed between the two sashes and illuminating the stained glass so as to be seen from the inside. The space between the two sashes forms a large ventilating flue, drawing the air from the church through the perforated panels of the wainscoting, the current being increased by the heat from the gas-burners within the space.

There are pews for deaf people, arranged with rubber tubes that can be applied to the ear and connected with tin tubes extending under the floor to a hollow box forming the front of the pulpit, and, the top or book-board being perforated, the voice of the minister is easily conveyed to these pews.

The arrangement of the gas-burners and the general system of lighting deserves particular mention, as it is the first known instance where it has been attempted. Every gas-burner is hidden from view by ornamental glass-work, giving a pleasant light, and enclosed and provided with ventilating flues, so that the combustion cannot vitiate the air of the auditorium. This will be better appreciated when it is considered that the eight hundred gas-burners in the church would vitiate the air as much as four thousand people by their exhalation, thus leaving only proper ventilation to be provided for two thousand occupants of the church. This is done by the best means thus far known in the science of ventilation. As stated before, at the northwest corner of the building there is a tower 100 feet high, 16 feet square, and, being open on the inside from its base to the roof, it forms an air-shaft down which the air is drawn by a fan at the base of the tower in the cellar, and is worked by a steam-engine of nominal ten-horse power. Ten feet above the floor of the tower, and inside of it, a perforated water-pipe extends all around the walls for the purpose of making a shower to cool the air in summer and free it from dust if necessary. Arrangements are also provided by which the entire cellar-floor can be sprinkled, so as to settle any dust and cool the air. The fan is constructed of iron, 7 feet in diameter, and has a capacity, when running at a speed of 220 revolutions per minute, of delivering 30,000 cubic feet of air during that time, and the volume of air thus thrown into the church is sufficient to renew the air of the church every fifteen or twenty minutes, without creating any perceptible current, as it is estimated that the air will not move more than from two to three feet per second. The entire cellar of the church forms an air and heating chamber, into which the fan delivers the fresh air. At the ceiling of the cellar there is a net-work of steam-pipes, in all 9,000 feet, and 3 inches in diameter. Before the air enters the auditorium it has to pass over the steam-pipes and becomes warm, and the pressure of the fan forces in a continuous fresh supply. The warm air passes into the auditorium through moveable slats inserted in the risers of the stationary foot-benches of every pew, there being one slat or register to every occupant in the pews, who can open or shut them as they desire. As the ceiling of the cellar is not plastered, and the steam-pipes are fastened along all the beams below the floor of the auditorium, the floor becomes thoroughly warmed and forms a radiating surface of warmth. Particular pains have been taken to avoid draughts of cold air, and should it be desirable to bring cold air into the auditorium, provisions are made to force it in at the ceiling, fifty feet above the heads of the audience, where it can diffuse itself and reach the audience without perceptible current. The fan was constructed by the Nason Manufacturing Company of New York. The steam is generated in two boilers, 16 feet long and 4 feet in diameter, each fifty-horse power. The steam-heating apparatus is called low-pressure and might be termed a hot-water apparatus, as a constant circulation of water is insured, and thus the danger of explosion avoided. The apparatus and all the work appertaining to it was furnished by the firm of Pitken & Co., of Hartford, Conn. The bellows of the organ is worked by a hydraulic apparatus, and this will be supplied from a tank in the principal tower, 125 feet above the sidewalk, a powerful steam-pump forcing the water from a cistern in the cellar into the tank, which will hold six thousand gallons of water. This tank and pump is also to serve the purpose of supplying the fire-hose, which are distributed above and below the roof of the church and all parts of the building, with water in case of fire.

The cellar of the church has been carefully concreted, and a smooth, hard floor made of Portland cement, to exclude dampness, and for this purpose the cellar-walls have been built hollow and cemented on the outside, and in addition an abundance of surface under-drainage is provided, and all the drain and soil-pipes are thoroughly ventilated. All the walls, ceilings, etc., of the cellar have been whitewashed, to give additional sweetness to the atmosphere. In the cellar, also in some of the upper rooms, the usual domestic conveniences of private houses are provided.

In the rear of the main auditorium is a hall, ten feet wide and having two spacious stairways leading to the galleries, which are also reached by stairways, six feet wide, in each of the towers on the Fifth Avenue front. Next to the hall in the rear is the chapel or lecture-room, 45 feet by 75 feet, and 25 feet high, with a gallery on one side, and spacious ladies' parlors, one above the other, on the Fifty-fifth Street end of the lecture-room, and so arranged as to be thrown into connection with the lecture-room and give accommodation to about seven hundred persons. There is also a commodious trustees' and minister's room. Over the lecture-room is the Sunday-school room, of the same dimensions as the former, and having galleries on two sides and one end; also several large class-rooms and a library. Over the class-rooms, on Fifty-fifth Street, is a flat for the assistant-sexton and family.

All the pews, gallery-fronts, organ-case, and all the interior joiner's work is made of the best of ash wood and polished. This work was done by Kimbel & Cabus, cabinet-makers. Some of the beautiful sculptured work was done by Ellin & Kitson, and some by Edward Plassman. The exterior of the building is faced with Belleville, N. J., stone. The mason's and stone-cutter's work was contracted for by James Stewart; the carpenter's work by Jennings & Brown. The painting and interior decoration was done by John H. Mohr. The organ is furnished by Jardine & Son.

A COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Pecksniff.*"

Should any of our non-professional readers desire to build according to this design, we trust he will do the author the simple justice of putting the work into his hands. We shall always be pleased to put client and author into communication with each other.

"'*Pecksniff*' presents an attractive cottage to the eye — one of the best in proportion and in judicious distribution of interesting features, each elevation presenting a point of interest against a background of sufficient plainness to give it heightened effect. The design is picturesque and yet is not without dignity. The details are sober and refined and show a keen artistic appreciation of architectural propriety. Unfortunately "*Pecksniff's*" facile fingers have run away with him. Within a most charming exterior he has jumbled his rooms together with the most wanton carelessness. His point of departure seems to have precluded all consideration of a winter dwelling. After a vestibule is passed one enters directly into the "living-room," from which the stairs open. Such an arrangement might be tolerable in warm weather, but is impracticable for winter use. But even tropical customs do not justify making his only access to the family bath-room directly from the dining-room. The front and back stairs are combined in a way more complicated than ingenious. On the second floor the rooms open conveniently into each other but are carelessly cut up. Though one of the five chambers is indicated as a servant's room, there is ample space in the attic for one or two more rooms, but no means of access is provided to it. "*Pecksniff*" might, by a thoughtful economy in the size and arrangement of his rooms, bring his now too expensive scheme within our limits of expense. His schedule of costs is misleading, especially his item of $25.00 for plumbing, which, even were a convenient place for the bath-room near the kitchen pump provided — instead of its present impossible

position — is quite inadequate for modern requirements. It is to be regretted that one who is capable of such excellent design should appear so utterly incapable of devising or studying a plan, and we recommend to this competitor careful study of the principles and details which govern plans." — *From the Jury's Report.*

HOUSE FOR REV. W. J. HOLLAND, PITTSBURGH, PA. MR. G. S. ORTH, ARCHITECT, PITTSBURGH, PA.

THE $3,000-HOUSE COMPETITION. — VII.

DESIGN SUBMITTED BY "*Pecksniff.*"

ON account of the cost, "*Pecksniff*" has omitted hot and cold water apparatus in plan, locating Bath-room near Kitchen, so that hot water could be passed through slide in partition, and cold water pumped into tub from Kitchen sink; glass between Pantry and Bath-room being, of course, obscure glass.

Stairs are so placed that front and rear stairs and outside and inside cellar stairs are together.

Height of room at landing marked "*Den*," 8′6″, making ceiling-joists 2″ x 8″, 12″ on centres, and raising floor in Servants' Room about 8″ between closet and chimney.

The house is to be heated by portable furnace; nickel-plated registers in first story, japanned registers in second story.

OUTLINE SPECIFICATIONS.

Heights: — Cellar, 7′ 6″; first story, 10′ 0″; second story, 8′ 8″; cellar wall, 18″.

Lath and Plaster: — ⅜-inch lath, ⅜″ apart; plaster, two-coat work; last coat white hard-finish, lime, plaster-of-Paris and lake sand.

Timber: — All timber, except as otherwise mentioned, to be hemlock.

Joists: — 2″ x 10″, 16″ on centres; cross-bridged, average 5′ 0″.

Ceiling Joists: — Second story, 2″ x 6″, 12″ on centres.

Sills: — 6″ x 8″; posts, 4″ x 4″; studs, 2″ x 4″, 16″ on centres.

Plates: — 4″ x 4″; studs straight-bridged in each 4′ 0″ of height.

Rafters: — 2″ x 10″, 16″ on centres; hip and valley rafters, 4″ x 10″. Rafters and vertical surface, where shingled, covered with 1-inch rough roof-boards laid 1″ apart.

Shingles: — 18-inch sawed pine shingles, laid one-third to weather.

Gutters: — X-tin over 3-inch rounded strips; three conductors of galvanized-iron, 3″ diameter.

Exterior finish, of dry pine. Siding, 5½″ wide, laid 4″ to weather, on ⅞-inch milled and planed pine sheathing. Corner-boards, casings, water-table, etc., ⅞″.

Porches: — Sill, 6″ x 6″; joists, 2″ x 8″, 16″ on centres, cross-bridged; 1⅜-inch floor, matched and planed, lead joints.

Interior: — Floors, ⅞-inch planed and milled pine, not over 5″ wide. Floor in Kitchen, hard-wood. Partitions, 2″ x 4″, 16″ on centres, doubled around all openings.

Grounds put on for base, wainscoting, etc.

Bath-room wainscoted 4′ 0″ high.

Kitchen wainscoted 3′ 6″ high, with planed, milled and beaded dry pine, put on vertically, with neat base and cap.

Inside Doors: — 1⅜″, six panels, flush-moulded.

Front Door: — 2¼″, two thicknesses, flush-moulded, trimmed with imitation bronze. Other doors trimmed with three loose-joint butts; each leaf japanned, furniture, mortise-locks, white porcelain knobs.

Windows: — 1⅜″ sash; those that swing in 2″, rebated plank frames, with suitable fastenings; those not swinging, axle pulleys and weights, with cotton sash-cord.

Glass: — Double-thick sheet. Side-lights at entrance, rolled cathedral glass, light tints. Window at stair-landing, stained-glass, at $3 per square foot.

Stairs from living-room to second story to be oak; treads, 1⅛″, with nosings and coves; risers, ⅞″; landing, 3-inch oak strip, glued together.

Painting: — Three-coat work, four tints.

ESTIMATES OF QUANTITIES AND PRICES RULING AT ROCHESTER, N. Y.

17000 feet	Hemlock,	@ $13.00			
	Machine-work,	2.00	per M.		$331.50
	Labor,	4.50			
30000	Shingles,	" 4.50	" "		180.00
	Labor,	1.50			
2000 feet	Siding,	" 26.00	" "		60.00
	Labor,	4.00			
2000 "	Sheathing,	" 17.00	" "		40.00
	Labor,	3.00			
8000 "	Finishing-lumber,	@ $50.00			
	Machine-work,	3.00	per M.		744.00
	Labor,	40.00			
800 "	Oak,	@ $60.00			
	Labor,	45.00	per M.		78.00
	Doors				85.35
	Window-sash, glazed				132.02
	Trimmings				80.00
	Nails				35.00
	Painting				300.00
	Tin-work				30.00
	Gas-pipe				18.00
	Carpenter's total				$2,113.87
	Mason				$692.50
	Heating				105.00
	Plumbing				25.00
	Architect's commission @ 3 per cent				87.00
	Total cost				$3,023.37

MASON.

150 cubic yards excavating, @ $0.30 per yard		$ 45.00
91 perch stone,	" 2.50 a perch	227.50
10756 brick,	" 13.00 per M.	140.00
880 square yards lath and plaster @ $0.30 per yard		264.00
Tile for drain		16.00
		$692.50

Note. Builder's profit is figured in with labor. Architect's commission is in this city only three per cent, so I have taken advantage of the locality. Lath is figured with plaster-work.

ROCHESTER, January 1, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

I will build house as designed by "*Pecksniff*" for $2,936.37.

A. W. HOPEMAN,
27 Kelly St., Rochester.

IRON.

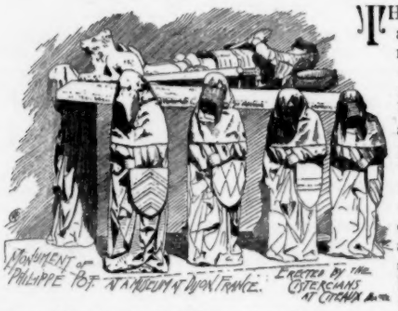
MR. GEORGE AITCHISON, A. R. A., recently delivered a lecture on iron as a material for the architect, at the Royal Academy. We append the substance of his remarks:—

Mr. Aitchison commenced by saying that he proposed, in the two lectures which he had to deliver, to enlarge on the most important and the most interesting subjects he knew, viz.: Iron and Color. He treated of iron first because he felt it to be of paramount importance for the architects of the future to consider this comparatively new material. We were, he said, in the midst of the Second Iron Age, and if the first discoverers of iron were able to conquer the then known world by its means, the second great discoverers, the English, had, through its aid, been able to make as great but more peaceful conquests, and to endow mankind with powers only dreamed of by novelists and poets. Iron in one of its three forms, — cast-iron, wrought-iron, or mild-steel, — was now one of the most important building materials we had, but, as yet, it had not been very completely brought into purely architectural use, except occasionally in the subsidiary forms of columns, bressumers, and girders. The great architects of the thirteenth century found brick, stone, and wood used much as they had been by the Romans, and the Romans were sound and even brilliant constructors, for, though they had not the unerring artistic instincts of the Greeks, they had a great capacity for producing splendid and magnificent effects. The Romans, however, had the tribute of the known world for their income, and armies of slaves for their work. No expense was spared on foundations, and daring feats of construction were not, in our sense, cramped by expense; but in all their flights thrust was opposed by mass. The architects of the thirteenth century — the greatest innovators the world had ever seen — had neither the Roman wealth nor Roman means, and had to trust to their own skill and ingenuity and to that of their skilled workmen, to construct buildings rivalling those of the Romans in extent and sublimity, and absolutely original in form, detail, and ornament. To do this they revolutionized construction. Vaults were no longer uniform arches of great thickness, but the groin-points were turned into ribs, and the filling-in was of extreme thinness; and where thrust could not be counteracted by thrust, it was carried to the ground by series of flying buttresses and a wide-spread base of the last buttress. In their carpentry, too, the heavy tie-beam was done away with, and each slender rafter bore its own truss. Could we suppose that, if such a material as iron had been in their hands, as it is in ours, they would not have rivalled our engineers in constructive skill, and, at the same time, given new forms to their buildings and impressed on them new decorations? It has been too much the fashion amongst architects to decry our engineers, — the true children of the age, whose sole aim is utility; and yet, looking at their works from the constructive side of our profession, what can be more admirable? They have carried their constructive skill to a pitch that even the thirteenth-century architects might envy; and no man can walk down the vast nave of the Crystal Palace and see its filmy construction and its flood of light without thankfulness and admiration; and if any regret mingles with its emotion, it is that the building's tenure of existence

is almost as frail as the spider's web it rivals. Architecture, it is true, has, in the present day, fallen upon evil times, but no architect should shut his eyes to the signs that by slow degrees this insensibility is passing away, and a faint and tepid interest is being awakened. But the position of architecture is not wholly due to outside influence; it is partly due to the retirement of its professors from the actual strife of the world. As he had pointed out in a former lecture, architects were inclined to pose as gentlemen and not as brick-layers. Roofs and domes were beneath their notice; they merely attended to the æsthetic part, and architecture had come to be looked on as a sort of potted art, — a delicacy for the *gourmet*, and not honest bread and meat for the multitude. Architects must free themselves from all this nonsense, and strive to be great constructors, doing what they can to impart character to our buildings. Passing on to consider minutely the materials with which he had to deal in the present lecture, Mr. Aitchison observed that cast-iron, wrought-iron, and steel are perfect materials, for, with the exception of the glazing, the whole of the structure may be made of each one of them, though practically their employment for certain parts of a building might be inconvenient. Iron can be cast into almost any form, and enriched with almost any ornament. Cast-iron is very strong as compared with other materials, and consequently takes up a small space, and particularly lends itself to the bony structure of a building, especially if the building be symmetrical. Its defects are that it rapidly transmits heat, and in damp weather horizontal pieces drip and vertical pieces stream with water. It melts in great heat, and if heated to redness and cooled by water it cracks. Its contraction and expansion under variations of temperature are considerable, and it rusts rapidly. Professor Barff's process is said to prevent rusting, but it is not practically in use. Iron may also be enamelled, but the cost is great, and the experience of its efficacy insufficient. Cast-iron is difficult to cast in very long pieces, and ornament cannot be chased after casting. Its peculiarities are that it is very heavy; that it is, roughly, six times as strong in compression as in tension; and that unless its parts are of nearly uniform thickness, it tears on cooling: so that in the case of girders the lower flange must be six times as wide as the upper one. Patterns have to be made for each piece: hence there is a strong desire for repetition to minimize the cost of patterns. Wrought-iron and mild-steel might be considered together, as they were practically the same material, only one is stronger than the other. Their capabilities are less than those of cast-iron in most particulars, but their tensile strength is much greater, being, in wrought-iron, about three and one-half times as great, and in steel five or six times as great. Both wrought-iron and steel can be rolled into very thin plates, and these plates can be riveted together, so as to be of any length. The defects of wrought-iron and steel are the same as those of cast-iron, except that they rust more readily; and though they will not melt under the influence of great heat, they crumple up like wet paper; and they are susceptible of no kind of ornament or shaping, except at enormous cost. Their peculiarities are that they are mostly built up,—*i. e.*, riveted together into the required form from plates, tubes, bars, L, T, H, and U pieces. As cast-iron is six times stronger in compression than in tension, and as much variation of thickness causes fracture in cooling, and we can rarely core the lower flange, there is a wonderful scope for ingenuity in trying to make a girder sightly. Again, in columns, every considerable swelling out, — as in caps, bases, or the lower parts of shafts, — is a source of weakness and danger instead of being an additional strength, as in wood or stone. All incised work is a fatal element of weakness, and if much relief is wanted in caps cast onto columns their ornaments have to be stuck on. Mr. Aitchison said he made no apology for treating of the natural qualities of the materials, for without knowing these it is impossible to design in them either with safety or propriety. Architects are, before everything, constructors, and paper architects are a mere burlesque,—even worse than sculptors without anatomy. To go farther, it is the want of a thorough knowledge of the properties of iron, and of the abstruse statical problems connected with its use that has condemned it to be so little used architecturally by architects. Two minds cannot act like one, and the scientific mind with no art, and the artful mind with no science, are apt to be like two horses pulling in opposite directions. The use of iron has restored the post and beam construction of the Greeks, and swept away the arches, domes, and vaults of Roman and Mediæval times. It is not that arches or domes cannot be made, but as there is no abutment the ribs must either be girders without thrust, or be trussed or tied. From the energy of the material the proportion of voids to solids is so great that it is unusual and unpleasant to the eye, and from the small size of the supports where they do occur they tend to effacement. In fact, this may be said generally of iron, — that it tends to effacement. In proportioning the parts of columns our module must be something different from half the diameter when the columns are, not from eight to ten diameters in height but from twenty-five to thirty diameters, or more. If we are to have old-world ornament we must go to the bronze tripods and candelabra of Greek and Greco-Roman times, or to those fantastic structures found in the arabesques of Rome and Pompeii which so stirred the bile of Vitruvius. Iron, however, is absolutely untrammelled by any former scheme of design or of ornament. We want to analyze the causes that produce satisfaction or admiration in our minds when we look at a building, and having discovered them, to endeavor to apply the principles to the iron-work we have in hand. This knowledge will prevent us from going wrong, but we must be blessed with invention if we are to go right. It is, perhaps, not so difficult to make a structure sightly when we have cast-iron columns of any considerable size, and cast-iron girders of inconsiderable span; but when the girders are of wrought-iron and of large span the difficulty is considerable; for the girders then mostly take the form of a series of strung triangles, with lines at the top and bottom, or of lattice-work. Iron will not do for external walls, and if we use brick, stone or concrete, the outside of the building ceases to show that it is iron construction. A feature might be made of iron in this way: between the main iron supports there might be thin iron ones, double-slotted, and filled with earthenware slabs ornamented in color; the black lines of the iron-work would then look well, — something like half-timbering on a small scale. A splendid hall ceiling might be made of cast-iron girders carrying smaller ones, so as to make small square panels filled in with red glazed earthenware domes, enriched with gold. Corrugated-iron is absolutely unusable, in point of effect, except on a colossal scale; when it can be so used, the corrugations, that destroy all scale where the size is small, merely give a texture, but we must then arrange for something to take off from its papery appearance where there are openings or overhanging roofs. Of iron buildings there are many, mostly of the corrugated-iron type, as churches, schools, sheds, etc., most, if not all, simply hideous. Iron, like other materials, is apt to bear upon its face the impress of other forms of construction. The arch is frequently exhibited in it, though perhaps this is not more ridiculous than wooden arches or wooden vaulting. Gasometers are sometimes picturesque structures, and different examples show how iron may be used so as to be ridiculous and ugly, or appropriate and elegant. As an example of the former, you see a series of attenuated Roman Doric columns set in a circle, each column with its capital connected at the top by thin pierced cast-iron girders, occupying an inch or two of the middle of the projecting caps; but, occasionally, gasometers whose shafts are connected with iron ties are quite picturesque; and, latterly, the lecturer had seen a very elegant one, of which the standards were battered on the outside, and made of heavy wrought-iron lattice-work, held together at the top and midway by very slight lattice girders. In England, we have three classes of people, — those of cultivated taste, who admire beauty and will not willingly do without it; those who pretend to admire beauty and do not; and those who neither like nor pretend to like it, and who shamelessly proclaim that beauty is all nonsense. Roughly speaking, the last class represents the age, more particularly so in regard to iron, because those whose architectural taste has been cultivated have cultivated it by the study of brick, stone, or marble buildings, and only look on iron as a makeshift, which they would not use if they could help it. Not that there is no elegant iron-work in England, for there were excellent bits here and there, as, for example, the iron-work to the glass domes of an office at the Bank of England, designed by Professor Cockerell, which, like all his work, is refined and elegant. In France and Belgium there is greater demand for artistic work than in England. The lecturer proceeded to speak of the essays made in those countries to develop the treatment of iron. Victor Hugo prophesied, after the event, that printing would kill Gothic architecture; pointing from a printed book to Notre Dame, he said: "This will kill that." Now hear the prophecy of another distinguished Frenchman, who echoes the words, "This will kill that," pointing from the cast-iron of the Halles Centrales to the stone-work of St. Eustache. "Iron will kill stone, and the time is near." Since the beginning of this century, only a single monument has been built — a monument copied from nothing, and which has sprung naturally from the soil of the epoch, and this is the Halles Centrales of Paris,—a swaggering work if you like, but which is only a timid revelation of the twentieth century. Although the Halles Centrales seem admirably adapted to their purpose, and have, in fact, served as a model for markets in different parts of the world, the problem of the use of iron for architectural effect has not been satisfactorily solved by them. Some of the details are good, but the buildings themselves exhibit a flatness and uniformity very far from the lecturer's notion of architectural beauty, and the best part, the gutter on corbels, is spoiled by the corbels being of stone proportions. The arch that joins the two blocks is thin, and not very nicely proportioned. The interior effect of the galleries is spoiled by a regular succession of skylights in the roof, which mar any grand effect of light and shade. Inside each block, the central part is impressive from its size and height. Its circular arches, and open spandrels filled with strap foliage, and its open cross and panel-work do credit to M. Victor Baltard's skill. There are, however, two splendidly successful works of iron construction in Paris, — the Northern Railway Station, by Hittorff, and the National Library, by M. Henri Labrouste. After describing the Northern Railway Station in terms of commendation, on account of its grand proportions, and the excellence of design shown in its iron-work, particularly in the columns—observing incidentally, that the columns bear the inscription, "Alston & Gourlay, Glasgow, 1862, British Iron-works," so that M. Hittorff found the brains although we found the labor and materials, — Mr. Aitchison proceeded to speak of the National Library as being as agreeable a room as one could wish to see. In the middle of the room are four most elegantly-slender cast-iron columns, bearing cross-braced wrought-iron arches, and from these spring nine domes with eyes at the top. The Fine Arts Schools, by Duban, has its entrance hall formed of cast-iron girders filled in between with cream-colored terra-cotta arched and slightly

enriched with a raised pattern. After M. Duban's death, M. Coquart had to cover the court to form a sculpture gallery, but was unwilling to touch Duban's work, so kept his few columns in pairs detached from the building, carrying the intervening spaces by iron cantilevers in the cornice. After incidentally mentioning the great extent to which bronze is used in Paris as a material for lamp-posts, railings, etc., the lecturer proceeded to speak of the Exchange at Antwerp, which has its central court covered in one span by wrought-iron trusses, and glazed at the sides, the collar-beam carrying a plaster ceiling. The wrought-iron bearers are treated after the manner of the wooden ones at Wollaton Hall. The constructional iron-work is so slight that it is almost lost, and to fill the vacant space and catch the eye, wrought-iron fruit and flower work has been introduced. A vast building for the sale of drapery, close by the station of St. Lazare, and called, "Les Magasins du Printemps," is now being built by M. P. Sedille. The whole interior construction is of iron, and each external bay is wholly of glass, the framework being of cast-iron, wrought-iron, and bronze, enriched by gilding, marble, and mosaic. It is worth study by architects visiting Paris. In conclusion, the lecturer expressed the hope that what he had said might stimulate his hearers to devote themselves to the architectural development of iron, the grand material of the future, with an ardor, a single-mindedness, and a self-denial that would not be in vain. — *The Builder.*

AN ARCHITECT'S RESPONSIBILITY.



THE extent to which an architect may be made liable for the negligent performance of his duty has been established with a tolerable degree of precision in the cases which have from time to time come before the courts; but the question yet remains, and it is one of considerable interest, how far and under what circumstances an architect may by his conduct lay himself open to a charge of breach of duty, both towards the employer and towards the contractor, by acting in such a manner as to afford reasonable ground for doubting the disinterestedness of his motives — in other words, what conduct on the part of the architect will lay him open to a charge of constructive fraud in his dealings between the parties?

It has been attempted over and over again, but hitherto without success, to charge the architect with liability for the negligent performance of his duty, that duty being one to the discharge of which the exercise of judgment and opinion is necessary. There is, it is true, an example recorded which would seem to give some encouragement to the view that an architect or surveyor is so liable. In that case the defendant was a surveyor, who held himself out as specially qualified as a valuer of ecclesiastical property, and it was admitted that the defendant had in this particular instance failed to observe the distinction between the case of a valuation as between incoming and outgoing tenant, and a valuation as between incoming and outgoing incumbent. Chief Justice Jervis thought that the surveyor could not be expected to supply minute and accurate knowledge of the law, but that, under the circumstances, he might properly be required to know the general rules applicable to the valuation of ecclesiastical property and the broad distinction between the cases of an incoming and outgoing tenant and an incoming and outgoing incumbent, and that inasmuch as it appeared from the evidence that the surveyor acted in the valuation as if it were the case of an outgoing and an incoming tenant merely, and that he knew no other rule.

It was held accordingly in this case that, although the surveyor was not bound to possess a precise and accurate knowledge of the law respecting the valuation of dilapidations as between outgoing and incoming incumbent, yet that he was bound to bring to the performance of the duty he had undertaken a knowledge of the general rules applicable to the subject, and of the broad distinction that exists between the case of a valuation as between the case of an incoming and outgoing tenant, and a valuation as between an incoming and outgoing incumbent. It will be seen that in this case the surveyor held himself out as being specially qualified for particular work and failed to perform it, and that his negligence did not involve the exercise of his opinion or judgment, but an absolute and culpable neglect to perform a specific work which he had undertaken to do.

In a case in which the plaintiff sought to charge the architect with responsibility for an inaccurate bill of quantities, on the faith of which he had entered into a contract, Lord Coleridge observed that the action would have been maintainable if it could have been fairly contended that the relation of the parties was this, and this only — that the plaintiff had undertaken to do certain work under a contract with a third person; that the contract was one to which the defendant was in terms no party; but that he was aware of it and had acted under the duty which it imposed on him of doing certain work requiring no judgment or opinion, but what he might call the exercise of ordinary arithmetical powers, and that his performance of that duty under the contract was necessary to enable the plaintiff to recover his money, and that he had neglected that duty. If that was the true construction of such a contract he was of opinion that an action would lie, for none of the cases cited in the argument were cases in which the imposed duty was such as he had described, and the breach of duty of the nature that he had indicated. The present claim, however, was not such an action, but was really an attempt to bring an action for negligent performance of duty, to the discharge of which the exercise of judgment and opinion was necessary. It was held that in the absence of fraud the action was not maintainable.

It was of course conceded in the case to which we have last referred that the exercise of judgment and opinion on the part of the architect were necessary to enable him to take out the quantities, and the principle upon which this decision was founded may be further illustrated if we suppose the case of a builder seeking to charge his employer with liability for the inaccurate quantities supplied by the architect. The defendant employed an architect to prepare plans and a specification for a house, and to procure a builder to erect it for him. The architect took out the quantities, and represented to the plaintiff, a builder, that they were correct, and the plaintiff thereupon made a tender which was accepted. The quantities proved to be incorrect, and the plaintiff expended upon the building a much larger amount of materials than he contemplated. It was held that there was no evidence that the architect acted as the defendant's agent in taking out the quantities, or that the defendant guaranteed their accuracy, and that therefore the plaintiff could not recover more than his contract price. These examples are sufficient to illustrate the principle that an architect is bound to bring to the discharge of his duty ordinary skill and ability, but that he cannot be rendered liable for the consequences if his judgment, honestly exercised, should it turn out to be erroneous, or if his opinion, given in good faith, should be found to be wrong or inaccurate. Where, therefore, the exercises of judgment or opinion on the part of a third person are necessary between two persons, and in the opinion of one of the two such opinion or judgment has been wrongfully or negligently exercised, no action can be maintained against a person standing in the position of a third party, that is to say, the architect.

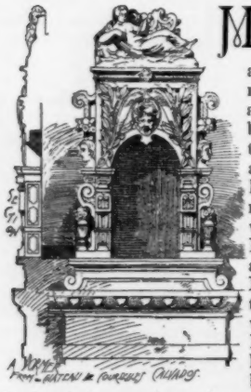
But there is another light in which the relation of the architect both to the builder and employer should be viewed before we can accord to him absolute immunity from the consequences of his apparently erroneous opinion or negligent or unskilful discharge of duty. The architect is bound to act with strict probity and impartiality in his dealings between the parties. He must enter into no secret or tacit understanding either with the builder or with the employer, neither must he act in any other manner inconsistent with his duty to both. His position is founded on the assumption of his integrity and impartiality, and if he by his acts afford reasonable ground for presuming that his opinion or judgment has been biassed or influenced in a manner inconsistent with such an assumption, he becomes at once liable for whatever injurious consequences may follow to either party. Where, for example, the architect was appointed arbitrator in respect of extra works under a builder's contract, and it was proved that the architect had guaranteed to his employer that the total cost should not exceed a specific sum, but that that fact had not been disclosed to the builder at the time when he signed the contract, it was held that the guaranty was a material fact tending to influence the architect's decision, and as it was not disclosed to the builder, he was not bound by the submission to the architect's arbitration.

A case has, in fact, been recently tried at the Crewe County Court in which this very important question was raised and discussed, and the facts of which illustrate very forcibly the delicate and responsible nature of an architect's duties. The employer claimed damages against the architect and builder jointly for a breach of contract in erecting two dwelling-houses. The plaintiff, it seems, employed a Mr. Atkinson, an architect, to prepare for him plans and specifications for the erection of these two houses. Tenders were invited, and eventually the tender of a Mr. Potts, the other defendant, was accepted to build the houses for £460. The plaintiff alleged that Potts had used inferior materials in the construction of the houses, and that Atkinson had passed over the defects without correcting them, or complaining of them or of the inferior materials used. There does not seem to have been any suggestion of fraud or collusion made by the plaintiff in the first instance, and the objection was rightly taken that no cause of action existed under such circumstances, there having been the usual condition imported into the contract to which the plaintiff and the defendant builder were parties, that the work should be done to the satisfaction of the defendant architect. But it would seem that the evidence, so far, disclosed sufficient facts to induce the judge to hear the case and reserve to himself the power of determining whether there had been such fraud in the transaction as would allow the action to be maintained. From the evidence, and the eventual decision of the judge, there could be no doubt that the materials used in the erection of the houses were of a very inferior quality, that the work was not done in accordance with the specification — in fact, that the work had been "scamped" throughout. The architect, however, had passed the work, and the

builder was entitled to his money. So far, therefore, however bad the work or inferior the materials, the architect, being chosen arbitrator between the parties and having passed it, the plaintiff had no redress. But other facts were disclosed in the course of the evidence which led the learned judge to the conclusion that the architect had acted in a manner inconsistent with his duties towards the parties under the contract, and that under such circumstances the contract could not be considered conclusive against the plaintiff. It seems that Mr. Atkinson, the architect, had been in the habit of preparing plans for Potts, and that this fact was not communicated to the plaintiff at the time when the contract was entered into. The judge rightly termed this an unfortunate thing, but unless this fact were coupled with other circumstances it could not be considered of sufficient importance to ground an allegation of fraud against the architect. But it appears that the architect had handed over to the builder the plans and specifications for the work, and had not even kept copies which he was bound to do for the protection of his employer, and had altogether acted in a manner inconsistent with his duties towards his employer. In giving judgment in the case the learned judge observed that both the defendants had perfect cognizance of facts which, if they had been disclosed to the plaintiff, made it quite certain that he would not have allowed the defendant, Mr. Atkinson, to be an arbitrator between him and Potts in respect of those two houses. Potts had gone about the work in a very loose manner, not having, as he himself admitted, read the specifications before he took the contract. An architect in ordinary cases would have had a copy made of the plans and specifications, and kept them for the protection of both parties; but here it was shown that Mr. Atkinson had handed over the plans and specifications to his co-defendant, who lost them, and an action had to be instituted for their recovery. Alluding to the evidence as to the repairs needed, the learned judge remarked that several matters included in the specification had been altogether omitted, and that very great defects existed in the work as it stood. He proceeded to give the judgment for the plaintiff in respect both of the defects in the work and inferior quality of the materials used.

An architect cannot be too scrupulous in his professional conduct, and if he stand towards the builder in such a position as to render it impossible for him, in the judgment of reasonable men, to act in an honorable and impartial manner towards the employer, by reason of conflicting interests or engagements hostile to his employer's interests, he is bound to disclose all such facts to his employer before he accepts a position incompatible with any such relation or engagements. Should he fail or neglect to give his employer information of such material facts, he will be held liable in consequences, which may be disastrous both to his pocket and to his reputation. — *The Architect.*

THE PHŒNICIAN ANTIQUITIES OF MALTA.



MALTA stands to most Englishmen for a great naval station in the Mediterranean, a half-way house to Egypt, a place where there is a fine climate, much going to and fro of men and ships, and a native population forming the background of a floating society of military Englishmen. Historically, one is apt to think of it as belonging to the Knights of St. John of Jerusalem, who made it their stronghold, after they were driven by the Turks out of Rhodes, — while a Biblical student here and there may identify it with the Melita where the savage people showed themselves hospitable to the shipwrecked Apostle to the Gentiles. Few, we venture to say, have ever looked upon it as a place where are to be found Phœnician antiquities of a kind existing nowhere else. Yet this is what Professor Sayce, of Oxford, one of the most accomplished Orientalists of our time, declares to be the case. He speaks in the strongest terms of the "archæological treasures" of the island. "The Maltese Islands" he says, "are the only part of the world in which remains of Phœnician temples still exist. Elsewhere, in Cyprus, in Africa, in Phœnicia itself, they have disappeared, and we have to derive our knowledge of buildings which must have structurally resembled the temple erected for Solomon by Phœnician architects from the notices of ancient writers. In Malta, however, the ruins of Hagiar Kim and Innaindra allow us to trace their ground plan and details, while the so-called Giants' Tower in Gozo is a still better-preserved specimen of a Phœnician sanctuary." Unfortunately these most interesting ruins are fast falling into decay. The "Giants' Tower in Gozo" is, happily, the property of an enlightened nobleman, who has placed it in careful guardianship. But elswhere neglect reigns, and ruin increases from day to day. Where in certain cases, excavations have been made with striking results, the peasant proprietors not having been compensated for the loss of their land, have idemnified themselves by treating the monuments after the manner of their kind. "The temples of Hagiar Kim and Innaindra," says Mr. Sayce, "which were excavated in 1839, are being rapidly destroyed. The peasants on whose land they are naturally regard them merely as useful quarries for stone or attractive resorts for picnic parties. I found, upon visiting them, not only that many of the monoliths composing the walls of the chambers have been recently removed, but that even the altar-stones, so precious in the eye of the archæologist, have been wantonly thrown down and broken." In one place, Coradino, which appears to have been one of the chief seats of Phœnician civilization in Malta, Mr. Sayce traced the remains of no less than five Phœnician temples. But although this is government property the ruins are fast disappearing. Engineers, some time ago, took the stones to build fortifications with, and what the engineers left the neighboring peasants are eagerly appropriating. Yet the lack of protection, it would seem, can only proceed from want of information on the subject in high places. When a Roman villa was discovered at Civita Vecchia, the Maltese Government walled it in and gave it a custodian at the public expense. Yet Roman villas are common enough all over Europe, "while it is only in the Maltese islands that the archæologist can still find the remains of Phœnician sanctuaries." We commend the subject to Mr. David MacIver as one that he can make his own with real advantage to the public. He knows Malta well, and has some right to speak for it. And he would be much better engaged in protecting the last architectural vestiges of an extinct religion than in trying to galvanize into fresh life economical theories that are just as dead. — *Liverpool Post.*

NOTES AND CLIPPINGS.

Bending Copper Tubes. — For bending copper tubes the almost universal practice is to fill the tubes with lead or rosin, then bend them round the chuck, or something of the same radius as that required for the bend. The lead or rosin may then be melted out. A machinist at Philadelphia some years ago, devised an ingenious apparatus for this purpose, which, however, has not come into general use. It consists of a flexible mandrel of steel, made of wire of square cross-section, and with the coils lying in contact so as to form a close spiral. By inserting one of these of the right diameter into the tube, it can be bent to any angle without wrinkling. When properly bent, the mandrel can be readily withdrawn by simply taking hold of one end of it and drawing on it, giving it, at the same time, a slight twist to lessen its diameter. At the time this invention was first brought out, it was said to answer the purpose very well. — *The Metal Worker.*

The Ponte Vecchio, Florence. — Word reaches England from Florence that the Ponte Vecchio — the ancient bridge over the Arno — is shortly to be pulled down because unsafe. It is said to be in danger of being carried away by the Arno in flood time. "We need hardly point out," says William Morris, of the Society for the Protection of Ancient Buildings, "the unrivalled historical interest and artistic beauty of this world-famed bridge, with its three graceful arches crowned by a picturesque group of houses, over which is carried the long passage connecting the Pitti and Uffizi palaces. Not only the arches of the bridge, but portions of some of the houses, are still preserved exactly as designed by Taddeo Gaddi, and built in A. D. 1362 — an object of the greatest beauty both when seen close at hand and as one of the chief features in the glorious distant view from San Miniato." He has no doubt that some careful engineering work is required to save the bridge, the foundations of which have been seriously undermined by the scour of the stream; "but it certainly," he adds, "would not be beyond the skill of modern engineers to underpin and secure the falling piers." — *Pall Mall Gazette.*

Discovery of an Altar-Piece by the Brothers Van Eyck. — There has been much said in the Belgian papers, and also in some of the English journals, about the discovery of an important altar-piece by the brothers Van Eyck. The facts of the case seem to be these: For centuries this altar-piece had lain unheeded in the hospital at Enghien, attracting no observation, until a short time ago it was given to the sculptor, M. Reuse-Leroy, in part payment for some work he had done for the hospital. He sold it to the Abbé Bosmans, archivist to the house of Arembery, who appears to be a clever connoisseur. Then, and not till then, was the picture discovered to be by Van Eyck. The Abbé Bosmans has deciphered on the right wing the signature, V. E. Y., and on the left wing a leafless oak tree, which he imagines to be a sportive allusion to the birthplace of the Van Eycks — *Maaseyck*, or old oak. All this, according to the London *Athenæum*, is pure hypothesis, which further says that Jan Van Eyck never signed in this way any of his known pictures; on the contrary, his signature is plain and full, and there seems no explanation of the Y. that ends the present signature. Nevertheless, the Abbé Bosmans is confident, and has published a pamphlet on the subject, by which he, no doubt, hopes to sell his picture to some of the great galleries. But it will need the judgment of many experts before it can be accepted. It was laid down as a rule by Wornum that, "unless an early Flemish work be perfect in all its parts, it cannot be by Van Eyck;" and this is not a bad rule for guidance. Does the newly discovered Van Eyck accord with it? The picture in question is a large triptych, depicting in the centre compartment the entombment of Christ; and, on the wings, a scene from the revelation, with St. John seated in a rich landscape in the foreground, and the divine mission of St. James to Spain, which would look as if it were originally painted for some Spanish patron. However this may be, it is too soon to conclude that the world is enriched by another of those magnificent altar-pieces that we know by the name of Van Eyck. — *Boston Herald.*